The MINING CONGRESS JOURNAL

Volume 9 SEPTEMBER, 1923 *Number 9*

Annual Convention of the American Mining Congress at Milwaukee, Wisconsin, September 24-29, 1923

Annual Exposition of Mines and Mine Equipment Milwaukee, Wisconsin, September 24-29, 1923

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Three Articles on the Coal Problem

An Outline of Transportation Problems

A Statement of the Platform of the Division of Industrial Cooperation

Two Powerful Articles on Standardization

Two Strong Articles on Mine Ventilation

A Review of the Month's News

The Prospects of Legislation

Five Pages of Editorials

And, the News

JOHN W. SHEERES

SACRAMENTO

THE CAPITAL CITY OF CALIFORNIA

AND THE CENTER OF THE RICHEST GOLD MINING DISTRICT IN THE WORLD

INVITES THE

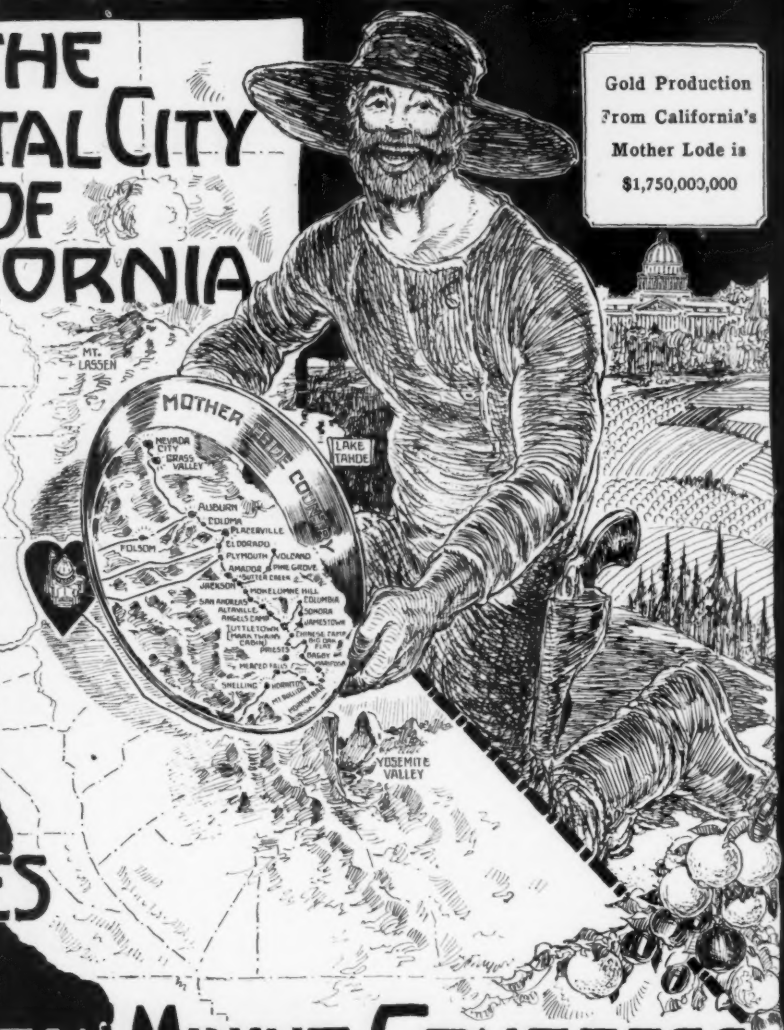
AMERICAN MINING CONGRESS

TO HOLD IT'S 1925 CONVENTION

IN THE NEW

SACRAMENTO MUNICIPAL AUDITORIUM

Gold Production From California's Mother Lode is $1,750,000,000



Come to Sacramento, where life is ever better, in 1925, and you will be taken to the famed mines of the Mother Lode, within 50 miles of the Capital City—the mines which produced the gold that saved the Union in the dark days of the Rebellion. You'll pass through verdant grain fields, glorious orange groves, and luxurious vineyards on your way to the Bret Harte and Mark Twain country over the old "Gold Trail of '49."

DEPARTMENT OF MINES AND MINING
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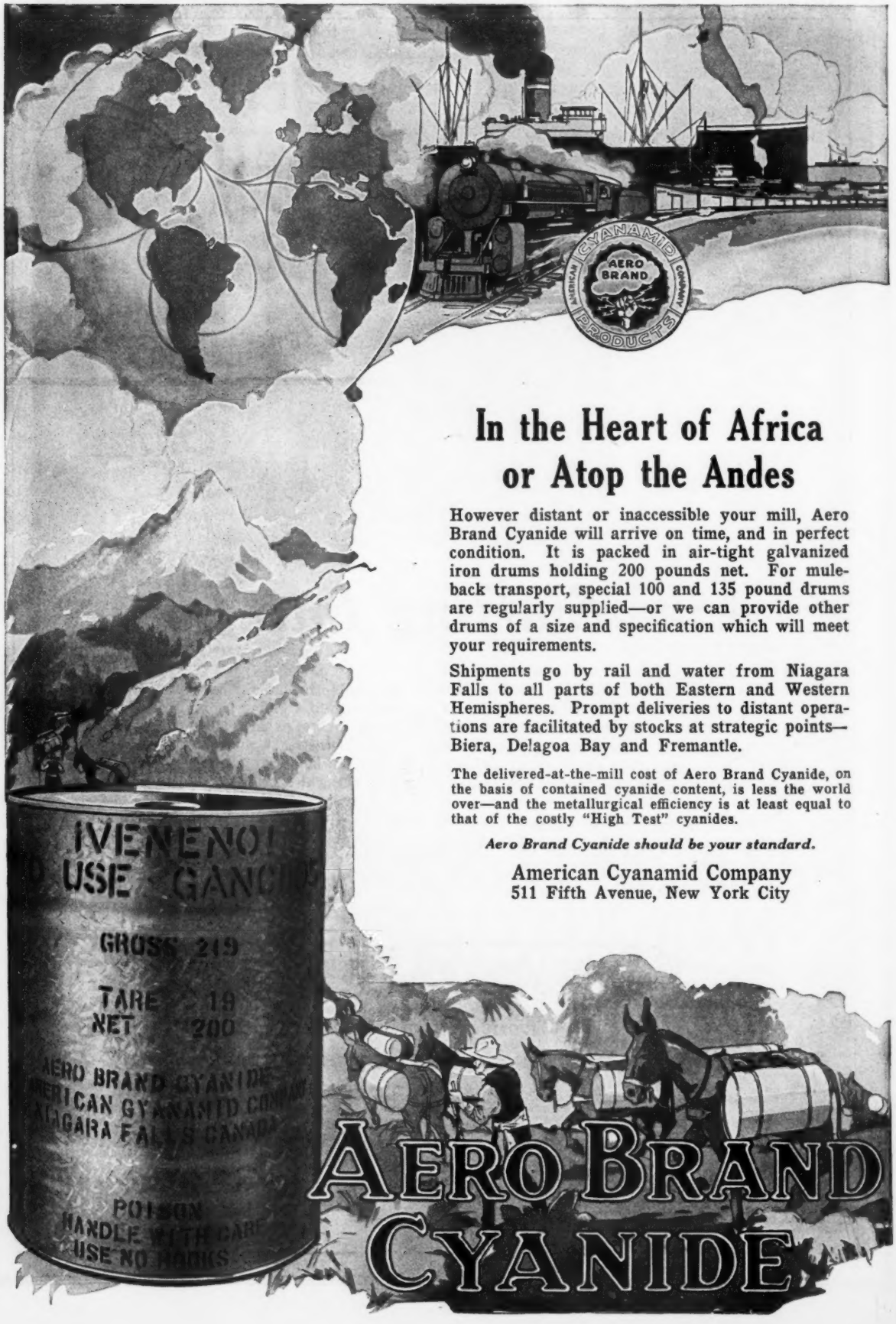

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SEPTEMBER, 1923

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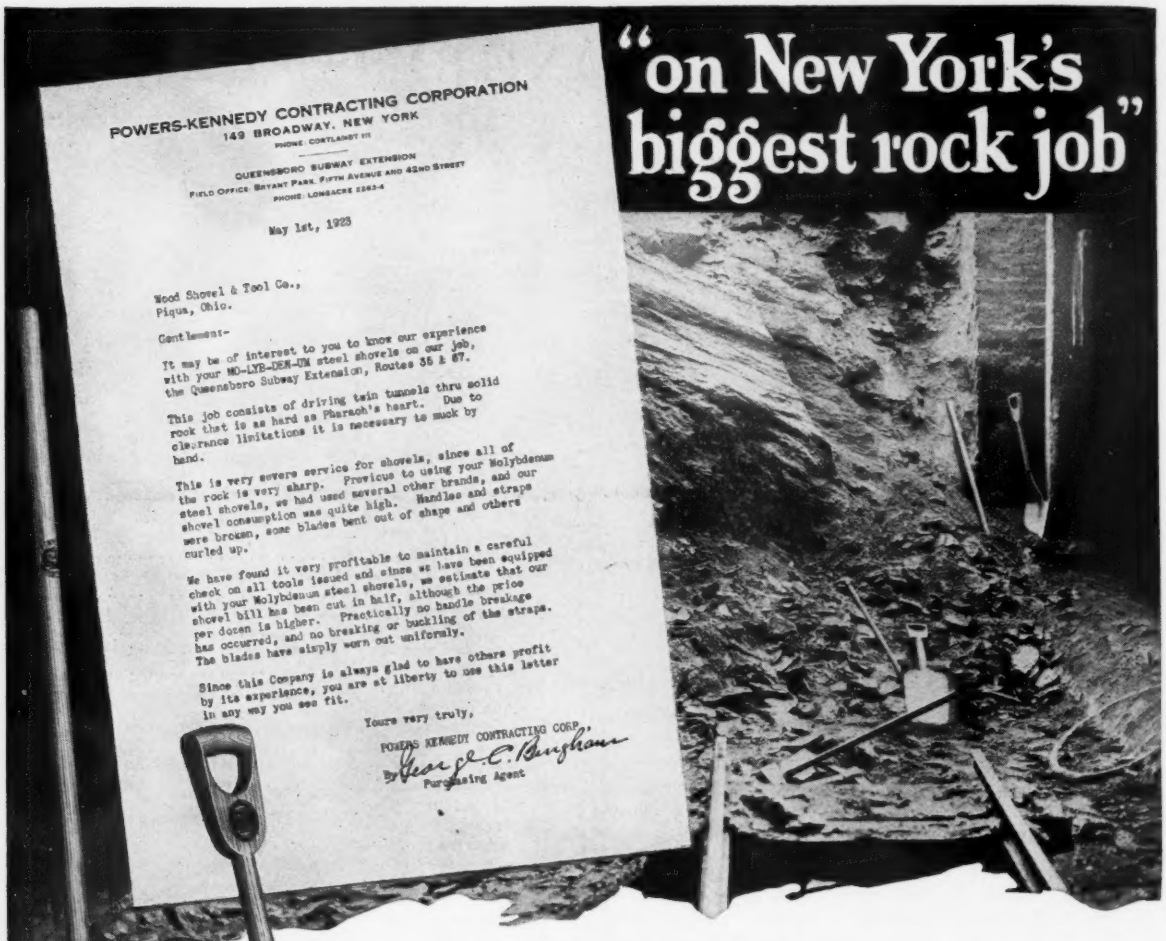
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QUEENSBORO SUBWAY EXTENSION
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May 1st, 1923
Wood Shovel & Tool Co.,
Piqua, Ohio.
Gentlemen:-
It may be of interest to you to know our experience with your MO-LYB-DEN-UM steel shovels on our job, the Queensboro Subway Extension, Routes 35 & 67.
This job consists of driving twin tunnels thru solid rock that is as hard as Pharaoh's heart. Due to clearance limitations it is necessary to muck by hand.
This is very severe service for shovels, since all of the rock is very sharp. Previous to using your Molybdenum steel shovels, we had used several other brands, and our shovel consumption was quite high. Handles and straps were broken, some blades bent out of shape and others curled up.
We have found it very profitable to maintain a careful check on all tools issued and since we have been equipped with your Molybdenum steel shovels, we estimate that our shovel bill has been cut in half, although the price per dozen is higher. Practically no handle breakage has occurred, and no breaking or buckling of the straps. The blades have simply worn out uniformly.
Since this Company is always glad to have others profit by its experience, you are at liberty to use this letter in any way you see fit.
Yours very truly,
POWERS KENNEDY CONTRACTING CORP.
By George C. Bingham
Purchasing Agent
"on New York's biggest rock job"

—they cut their shovel bills in half

Nothing need be added to the above letter. It tells of another triumph for Wood's Mo-*lyb*-den-um Steel Shovels. It is the latest of thousands of tests which have proved that these shovels wear two to six times longer than any other shovels made.

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Piqua, Ohio U. S. A.

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The American Super Steel

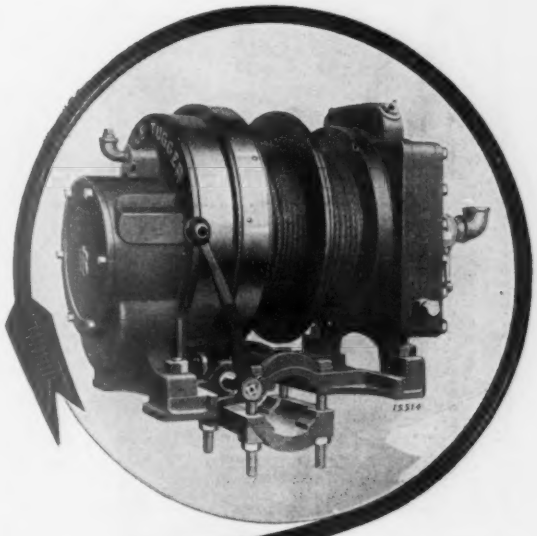
FOR SLUSHING— "LITTLE TUGGERS"

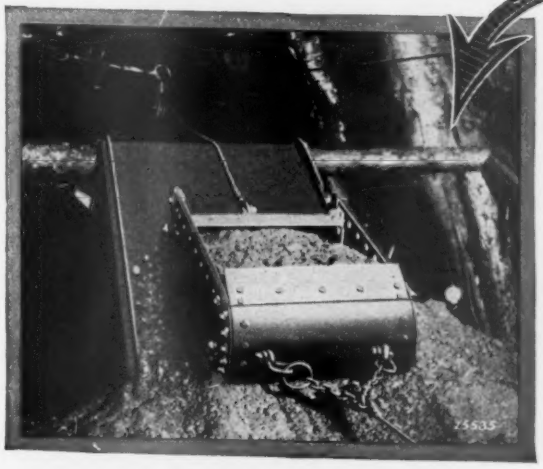
How Much Saving Is Effected?

The following on "Recent Practice in the Use of Scrapers" is an excerpt from a paper presented by Lucien Eaton, Supt. of the Cleveland Cliffs Iron Company, of Ishpeming, Michigan, at the 1922 meeting of the Lake Superior Mining Institute.

"When practicability and capacity have been established the next question that is always asked is—how much saving is effected? I always answer, roughly speaking, about half the cost of shoveling and tramming. In most cases the saving is greater than this. The saving effected will pay for this outfit every six months."

The No. 6-H "Little Tugger" Hoist has not only made slushing and the efficient use of scrapers possible, but is also an essential part of present day mining. Its double drum and reversible action gives the operator the capacity of TWO hoists at the price, cost of operation and maintenance of ONE.





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Capacity of Haulage drum at 110' per min. 65 lbs. pressure .....1500 lbs.

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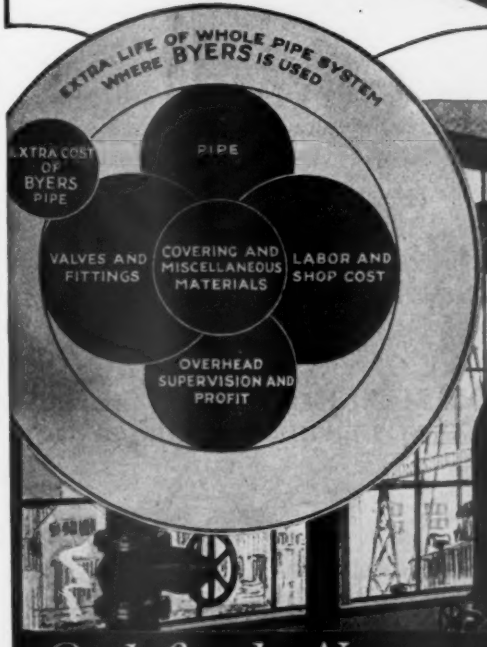
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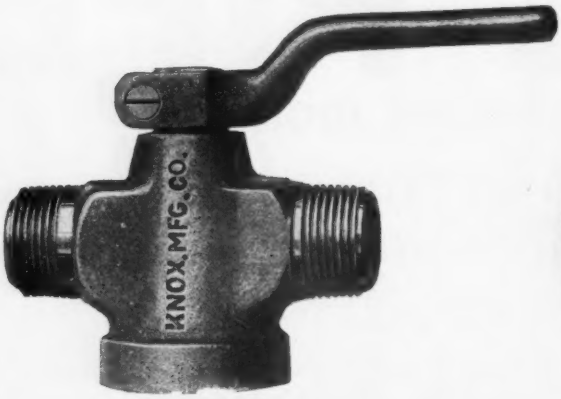
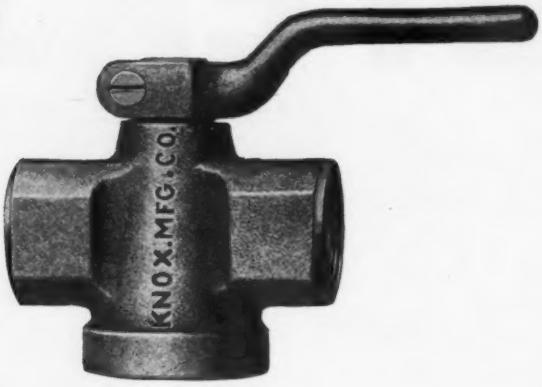


Male Thread



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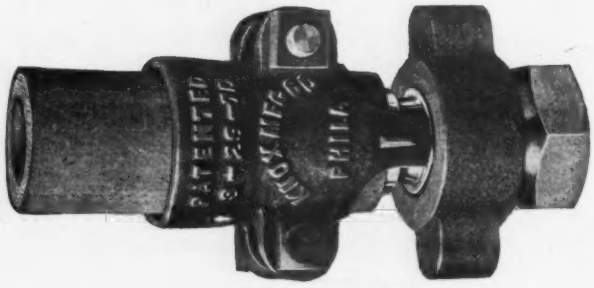

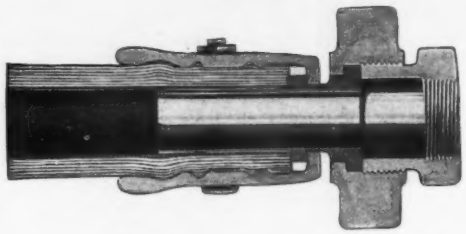

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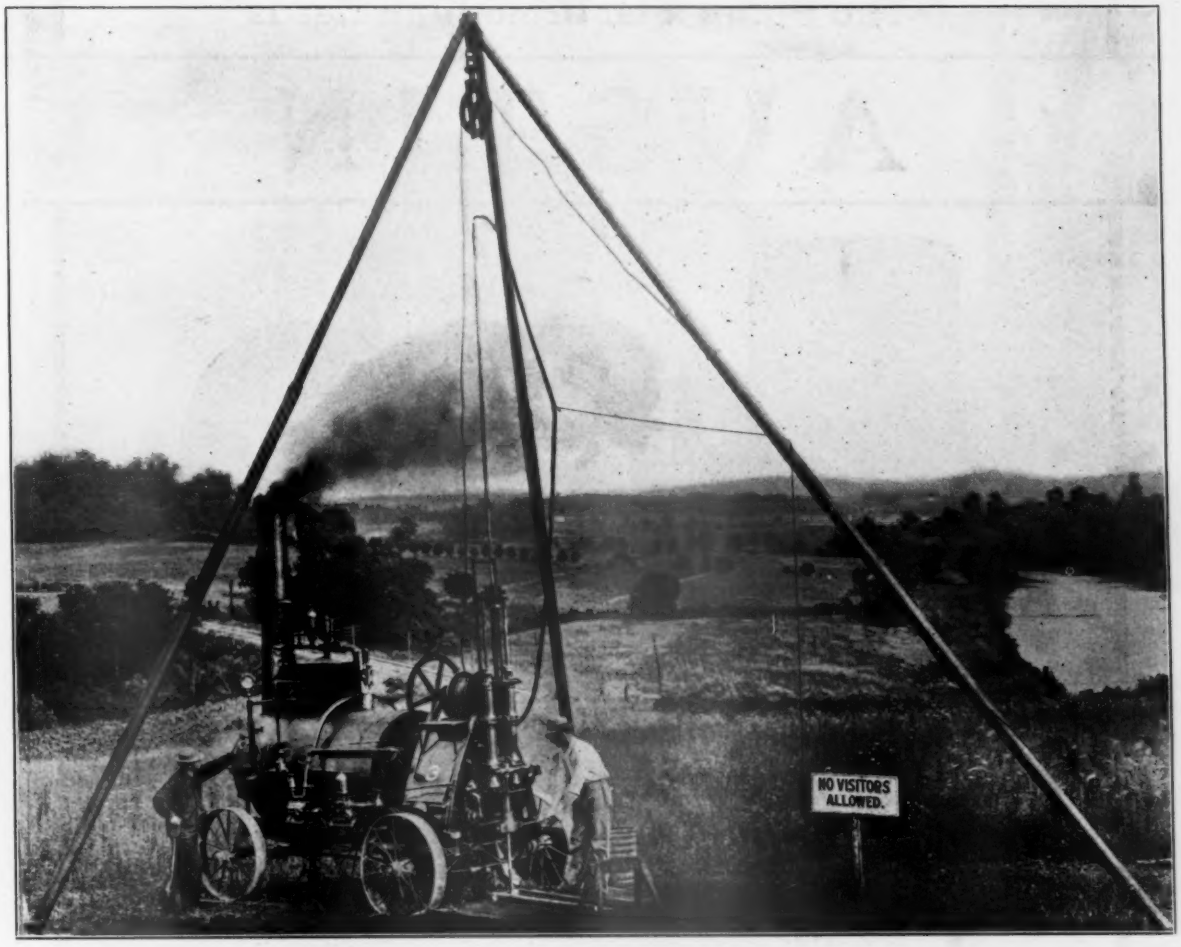

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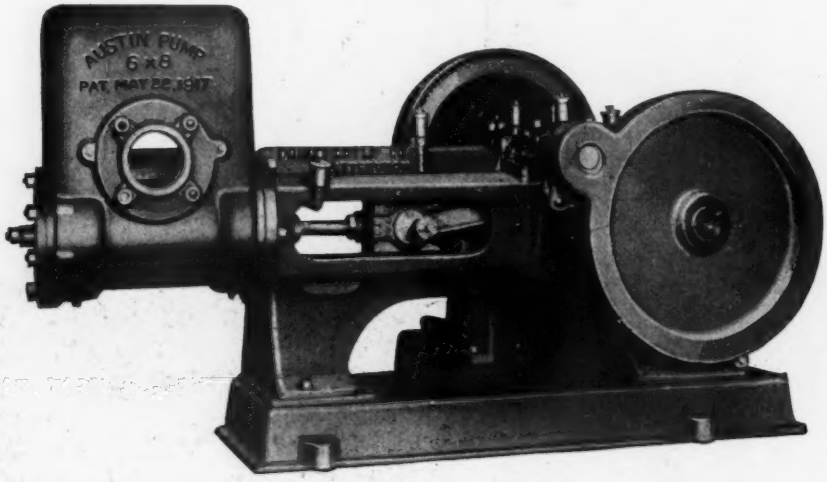

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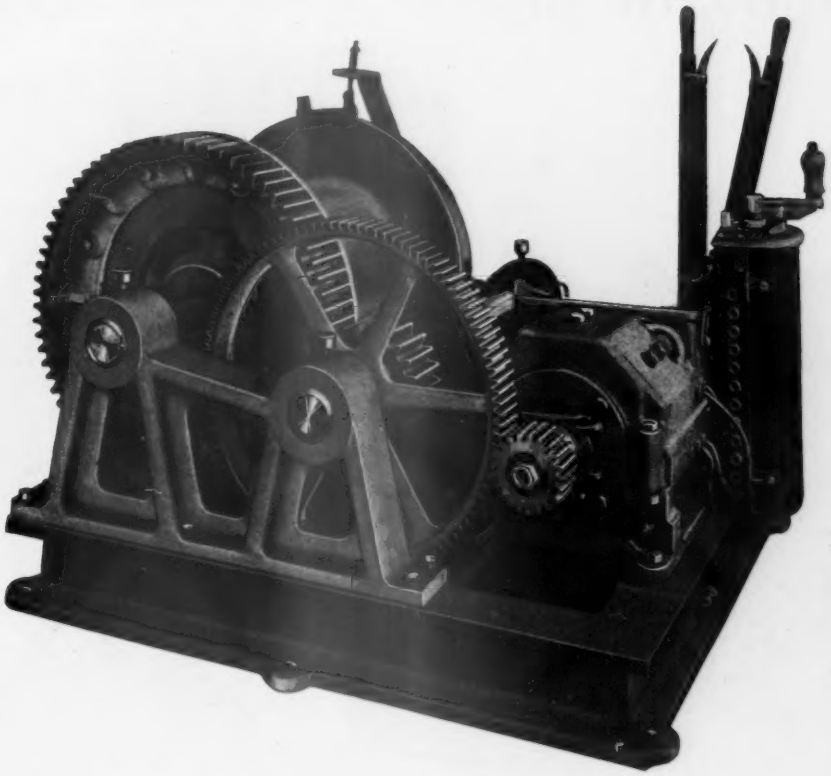

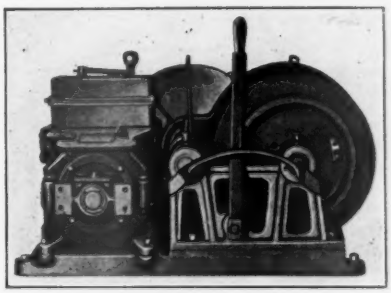

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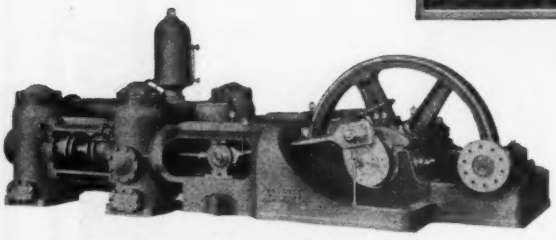

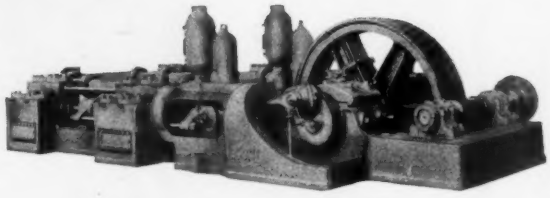

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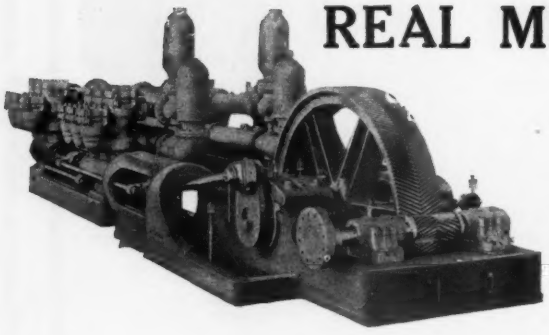

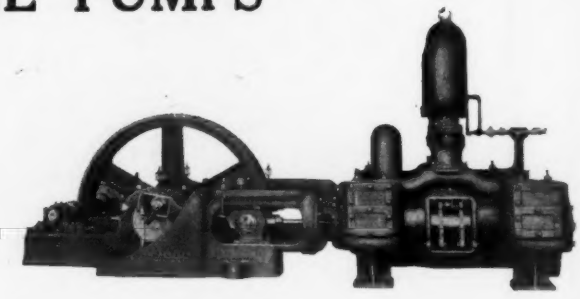

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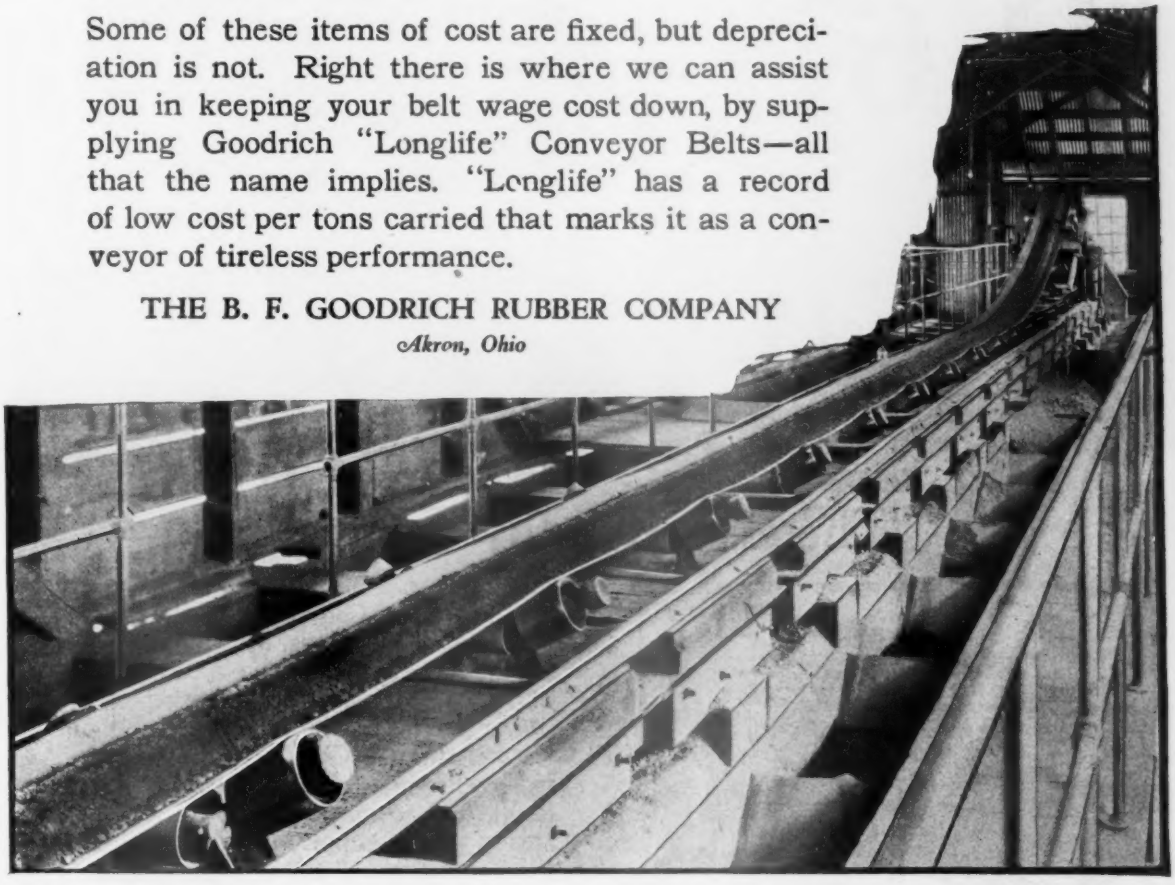

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For Pumping, Lighting, Hoisting, Driving POWER

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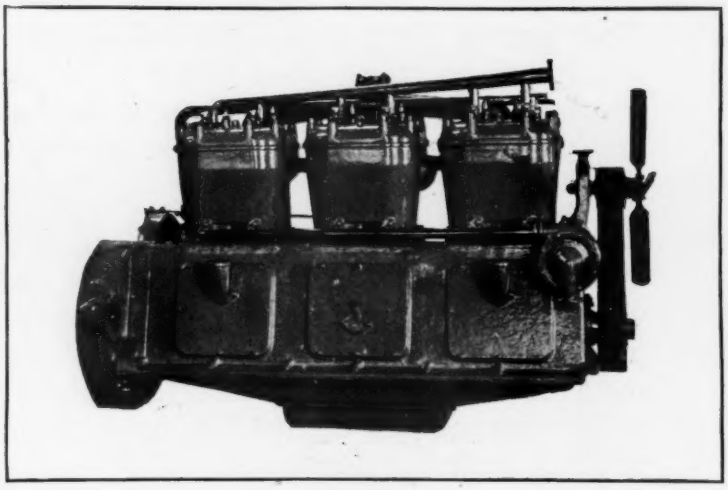

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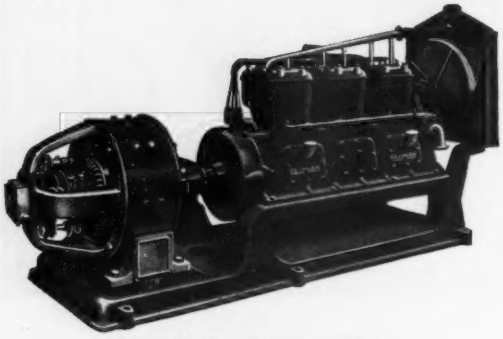
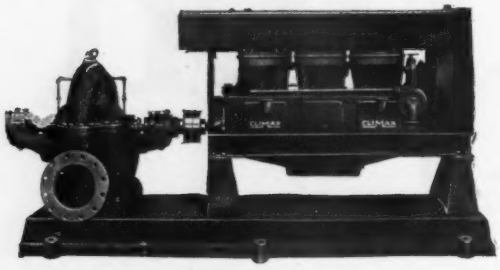


Climax Engine Generator Unit. Direct or alternating current. 50 to 80 KW, any voltage.



Climax Engine—Pump Unit. Speeds up to 1200 R. P. M.

At the Annual Convention of the American Mining Congress, Milwaukee, Wis., Sept. 24-29, you will have a convenient opportunity to examine this exceptional power plant. It is the largest member of the well known Climax line of "Trustworthy Engines." You will especially like its rugged, compact build, its smooth steady power supply, its ability to deliver its full rated power without laboring, its positive and thorough lubricating system, its complete accessibility, its fuel economy and its proven ability to

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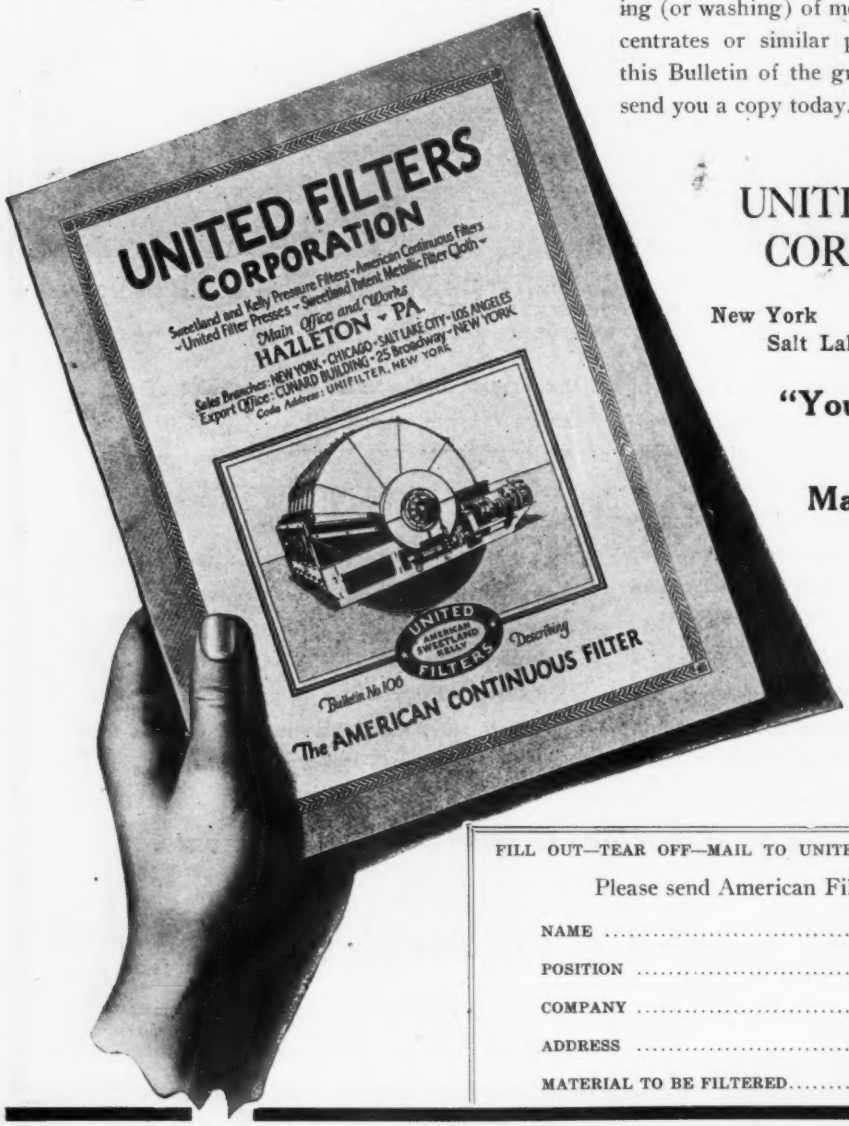
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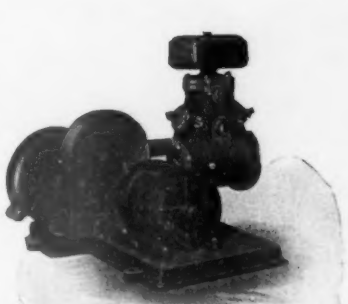
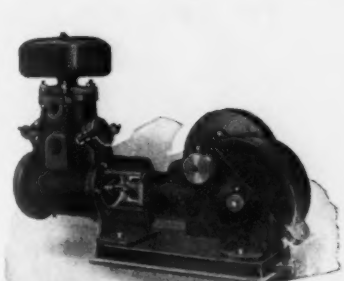
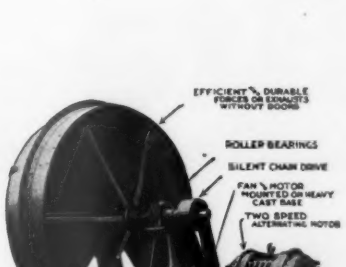


J. C. Stine outside packed electric-driven pump. View showing motors and guards. Description under illustration opposite. The dependable pump for all requirements.

The J. C. STINE Co. Tyrone, Pa. U. S. A.



Front view, no exposed gears. J. C. Stine's outside packed electric driven pump, 50 gallon capacity, 2½" suction, 2" discharge. A double-acting, solid plunger, self-oiling unit. The dependable pump for mines, quarries, railroads, etc.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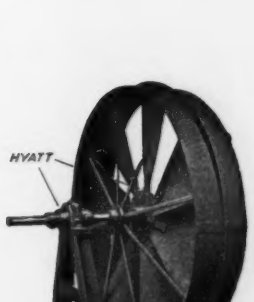
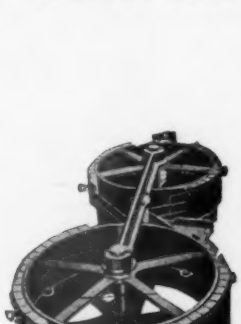
SOMETHING WORTH "BLOWING" ABOUT. J. C. STINE patented disc fans. For economical ventilation of mines. Cheap to install. High efficiency. More than 1200 in use. Literature on request. Illustration shows chain-driven type.



Belted type of J. C. Stine Disc Fan. Ten sizes in stock for immediate shipment. Easy to install. Cheap to erect. Last forever.



J. C. Stine Incline Plane Machinery, made in 19 sizes. No. 5 special, looking from the top. Every machine is standardized. All parts renewable. Quick repairs.

The house of integrity—where the promise is fulfilled. Pumps, motors and supplies in stock for immediate shipment.

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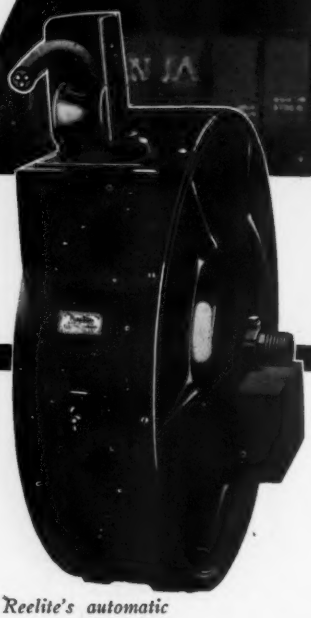

Reelite's automatic reef furnishes just the amount of cord required — keeps it clean and unbroken with the tool on the job, not up for repairs. Used also as adjustable fixtures, with portable lamp and light portable machinery.

There Is A Reelite Built To Carry Any Current Where You Need It

The new Heavy Duty Reelite is a big brother to the thousands of Reelites in use today in industrial America. For years, wherever portable cords are used, these Reelites have kept them reeled clean and unkinked—off the floor, away from the wheels of trucks and the heels of workmen.

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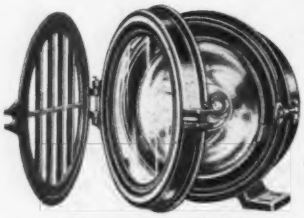
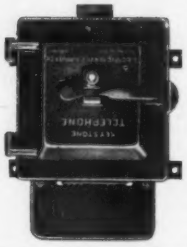


Golden Glow Headlights



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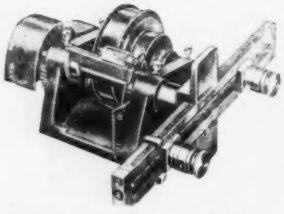

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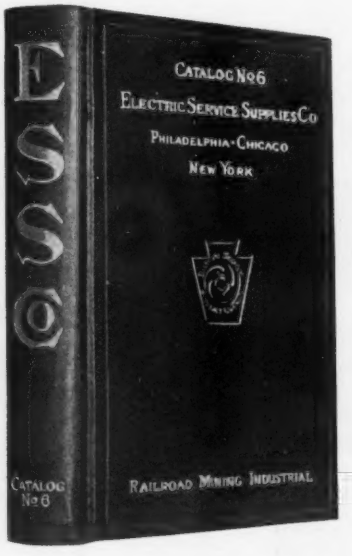

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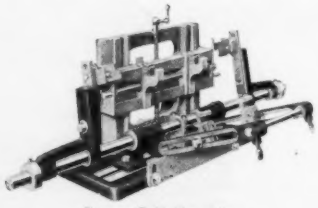

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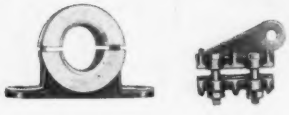
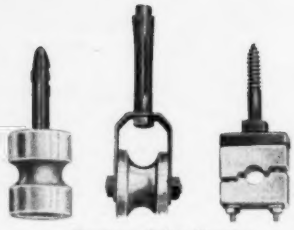


Keystone Cable Clamps



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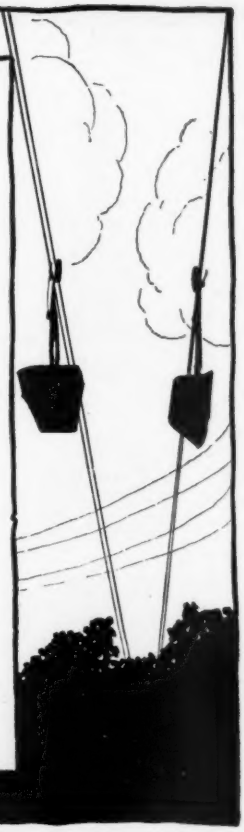

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A Few of the Leaders that Have Made Byron Jackson Pumps

Standards of the World

Sustained effort during the past fifty years to produce pumps that would meet the requirements of the mining industry for maximum efficiency and continuous operation with a minimum of attention, has given the centrifugal and deepwell turbine pumps of the Byron Jackson Iron Works a dominating position in the markets of the world. Space limitation permits of a discussion of only a few of the standard types.

Vertical Unwatering Pump with Short Motor Barrel

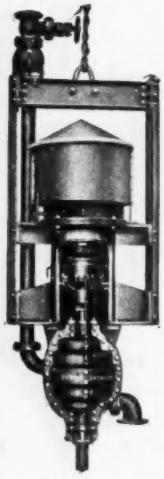

FIGURE 1
Vertical Unwatering Pump. Short Motor Barrel Construction.

This is the simplest construction of a vertical unwatering pump, requisite number of stages for any head or capacity being supplied.

Deepwell Turbine Vertical Shaft

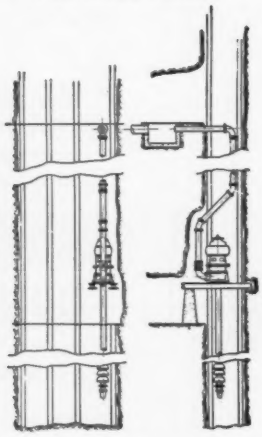

FIGURE 4
Dewatering Pump for Mine

This pump, a recent development in unwatering mine shafts, consists of a series of stages located at the bottom of mine shaft and suspended from the surface. Figure 4 illustrates the advantage of this type. Motor is set permanently above high water, eliminating shut down to permit of raising or lowering of pump. After starting, pump need not be stopped until shaft is dewatered.

Vertical Unwatering Pump with Channel Steel Frame

Where it is advisable to have a greater distance between the pump proper and the motor than is provided by Figure 1, this type (Figure 2) with channel steel frame, spacing the motor and pump 20 feet or more apart, is supplied. Recommended where necessary to safeguard motor against water damage. Both give same hydraulic performance.

Incline Shaft

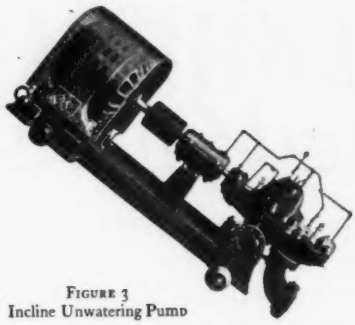

FIGURE 3
Incline Unwatering Pump

For incline work Figure 3 is furnished. Grease bearings throughout. Heavy thrust bearing between motor and pump, carrying the hydraulic thrust of pump and down thrust of motor through solid coupling between motor and pump shaft. May be operated at any angle from horizontal to vertical.

FIGURE 2
Vertical Unwatering Pump in Channel Steel Frame.

BYRON JACKSON IRON WORKS-INC.

Wherever water is to be lifted

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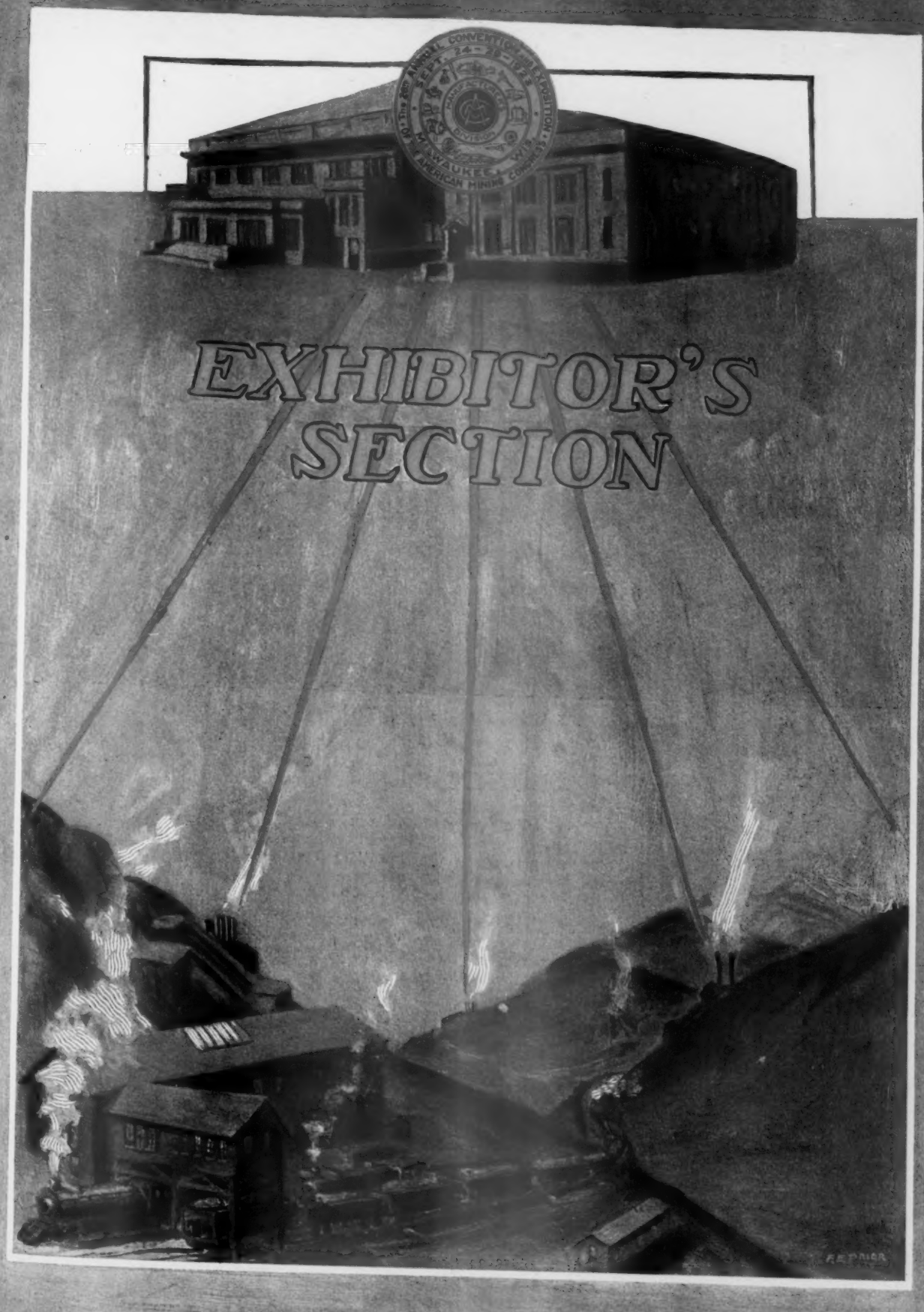
EXHIBITOR'S
SECTION

A View of One-Third of the Exhibits at the Cleveland Exposition, October 9-14, 1922

EDITORIAL

From the hand-pick and shovel with production of small tonnages and the utilization of only high-grade deposits, to highly specialized equipment with production of millions of tons and the utilization of our low-grade deposits, mechanical genius has been the bulwark of industrial progress of the nation. The people of the United States were indeed fortunate when inventive genius turned its searchlight upon the mining industry.

At the National Exposition of Mines and Mine Equipment to be held in conjunction with the 26th Annual Convention of the American Mining Congress at Milwaukee, Wisconsin, September 24th to 29th, more than two hundred progressive manufacturers of mining machinery and equipment will display their latest labor saving, cost reducing equipment.

Many of the exhibiting firms are pioneers in the industry. To them mining men gladly pay tribute, as well as to the later day genius who has helped solve many of the intricate problems that are inherent to modern production of raw material.

The appearance of these manufacturers at an operators' annual convention is an evidence of the solidity and cooperation of the various units that comprise one of the greatest of America's industries. Manufacturer and mining man will at this meeting discuss the immediate needs of the mining industry to the end that safety, efficiency and conservation shall become permanent.

At Milwaukee,

September 24-29, 1923

SEE OUR EXHIBIT AT THE MILWAUKEE EXPOSITION

"The Digging Fingers"

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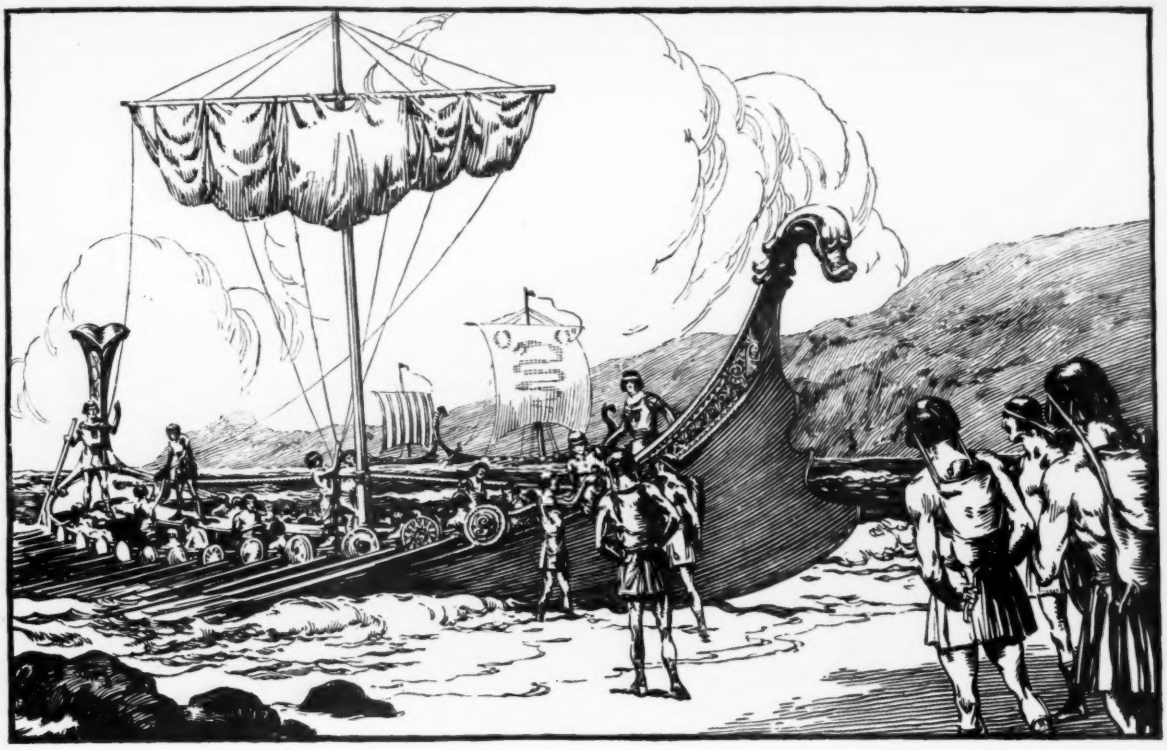

Silver for Hiram of Tyre

Hiram of Tyre was the metal king of the world in the tenth century, B. C. From Spain, his fleet brought back every third year the entire production of what is now the Rio Tinto Mine.

Three tons of silver a year was all that 40,000 workmen could produce in Hiram's time. In a recent year, at the same mine, 9,000 men, with the aid of explosives, mined 2½ million tons of ore. From this ore, almost 30,000 tons of copper alone was obtained.

But the cost of time and labor are so much higher now than when King Hiram worked the Rio Tinto that even dynamite, as great a labor saver as it is, must be scientifically selected and used.

On work for which it is suited Hercules Special No. 1 is more economical than the usual grades of dynamite. It contains about one-third more cartridges per case than 40% dynamite which it often replaces, cartridge for cartridge; at a saving of about twenty-five percent in blasting costs. It contains nothing but the highest grade of standard materials and by wide use on many kinds of work has proved its dependability.

To help you in using explosives most effectively, we have prepared a series of practical booklets. If you have not yet received them, write to our Advertising Department, 934 King Street, Wilmington, Del., for free copies of "Eliminating Waste in Blasting", "Scientific Quarry Blasting", and "Hercules Products".

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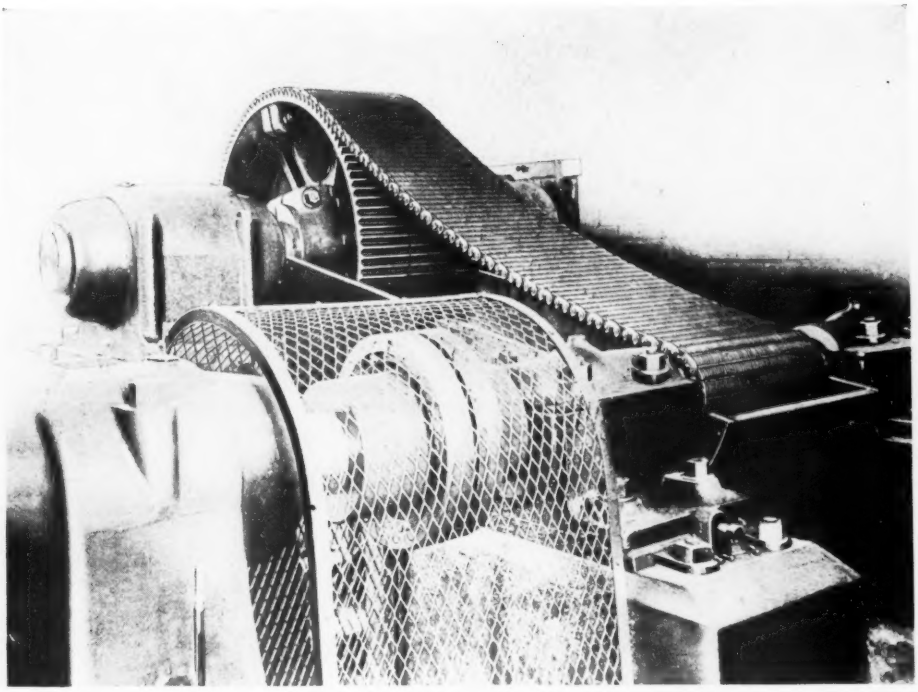
MOS o' thee by naow 'ave read the firs issues o' the H' Explosives H' Engineer, and I think thee'll h'all agree that tha country is worthy of such a paper; which 'minds me I 'as a lot to get h'off my cheens durin' tha h'open discushun h'on h'explosives at the Minin' Congress. I'm 'opin there'll be a 'eap o' blasters there to tell us w'at they naws.

Wilyum Jam

MORSE SILENT CHAIN DRIVES



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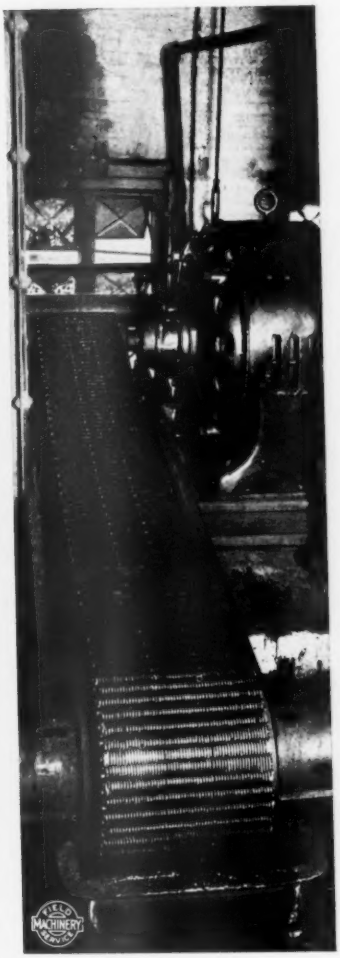
MORSE DRIVES

"Ventilation" *must* be continuous



Our Engineers will be glad to show the advantages of Morse Drives.

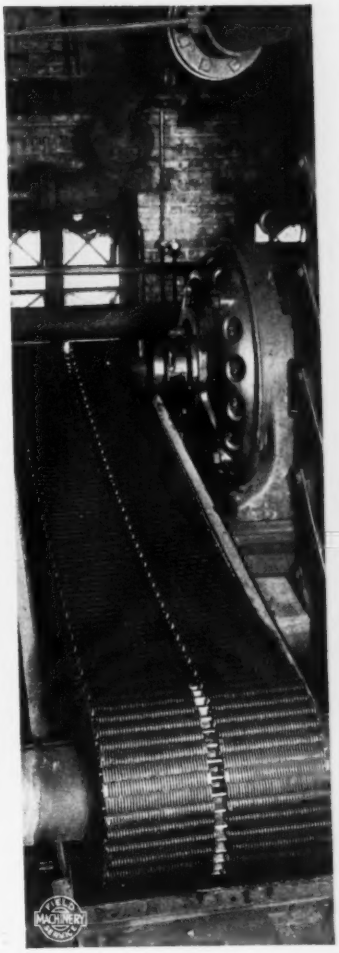
VENTILATION is one of the most important factors in efficient mine management. The photographs illustrate Morse Silent Chains driving ventilating fans.

Steady, uniform, continuous, free from constant repair service is demanded from the drive performing this important service. The selection of the Morse Silent Chain Drive is a natural one, in considering the vital function of the installation.

Morse Silent Chain Drives cannot slip, transmit and sustain 99 per cent efficiency with positive speed ratio between driver and driven. Permit the use of short centers, require little attention other than timely lubrication.

Our Engineers will be glad to show you how the Morse Silent Chain Drive can solve your power transmission problems.

Be sure to visit our interesting exhibit at Exposition of American Mining Congress, Milwaukee, Sept. 24 to 29.



No Service Too Heavy or Exacting for Morse Silent Chain Drives.

MORSE CHAIN COMPANY, Ithaca, N. Y.

THERE IS A MORSE ENGINEER NEAR YOU

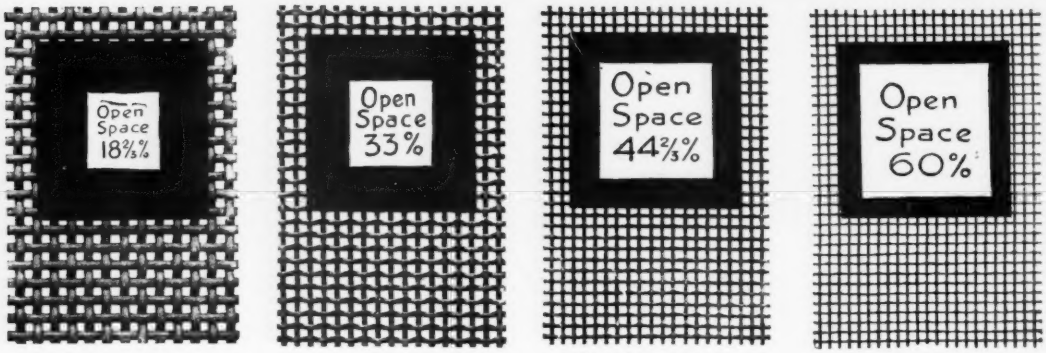
ATLANTA, GA.	Candler Bldg., Earl F. Scott & Co.	NEW YORK CITY	30 Church St.
BALTIMORE, MD.	1402 Lexington Bldg.	MINNEAPOLIS, MINN.	So. 3rd St.
BOSTON, MASS.	141 Milk Street	MONTREAL	St. Nicholas Bldg.
CHARLOTTE, N. C.	404 Commercial Bank Bldg.	PHILADELPHIA, PA.	Franklin Trust Bldg
CHICAGO, ILL.	Merchants L. & T. Bldg.	PITTSBURGH, PA.	Westinghouse Bldg
CLEVELAND, OHIO	Engineers Bldg.	SAN FRANCISCO, CAL.	Monadnock Bldg
DENVER, COLO	1761 Wazee St.	ST. LOUIS, MO.	Chemical Bldg., Morse Eng'rg Co.
DETROIT, MICH.	7601 Central Ave.	TORONTO	Bank of Hamilton Bldg.
KANSAS CITY, MO.	Finance Bldg., Morse Eng'rg Co.	WINNIPEG, MAN.	Dufferin St.

Spring Sprocket

Shear Pin Sprocket

Write for Catalog

"Morse" is the Guarantee Always Behind the Efficiency, Durability and Service



THERE IS A "PERFECT" SCREEN

Your Processes naturally determine your required Screen Opening.

Very Good. But many other vital points must influence your choice of weaves and weights.

Thoughtful selection of a screening surface considers ALL the factors bearing on the choice — available space for screening plant; type of mechanical equipment; maximum available screen feed; order of separation; power; time; attendance; replacement expense, etc.

AVAILABLE SPACE FOR SCREENING PLANT: where screens of great resistance must be used, far greater total screen area may be required to give the needed output. A greater proportion of active, open screening space per unit of screen area may give the same capacity as a far greater area of heavy, resistant screen.

TYPE OF EQUIPMENT: some screening equipment is so designed as to require a very heavy, resistant screen surface, thus sacrificing capacity and power to durability.

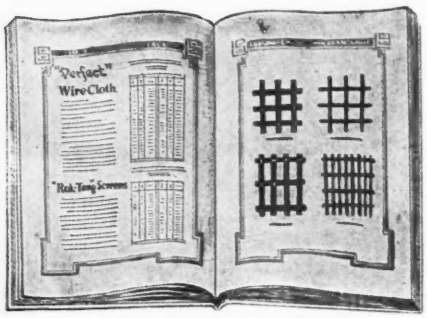
MAXIMUM AVAILABLE SCREEN FEED: crushing and conveying systems may often find their screens to be an actual drag upon production, because their screen surface resists the passage of the feed.

ORDER OF SEPARATION: modern plants effect great savings in power and in replacements by removing heavy oversize from the feed before it reaches the finer screening surfaces. This permits the use of screen surfaces of less resistance and greater proportion of open, active area.

POWER: regardless of the kind or application of power, a screen surface with a greater proportion of open, active screening space will handle a greater tonnage of feed per unit of POWER, because it takes the fines out quicker.

TIME: regardless of type of mechanism, shape of screen, or kind or application of power, a screen surface with a greater proportion of open, active screening space will handle a greater tonnage of feed per unit of TIME, because it offers less resistance to the passage of fines, and by an increased angle of flow may speed up the discharge of oversize.

ATTENDANCE: a screen to give the maximum results requires intelligent attendance. Much depends upon the type of mechanism, but a screen surface that does not readily clog effects considerable savings.



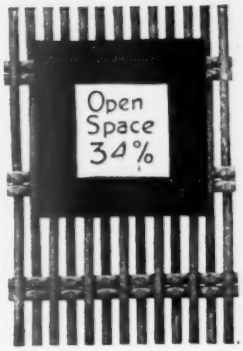
Over 1,000 grades of woven screens are listed in this catalog

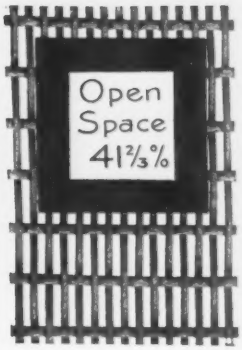
REPLACEMENT EXPENSE: screen surfaces selected for maximum proportion of active open screening space must be carefully chosen for durability and rigidity. Openings must resist warping or distortion in service, and the wires must have sufficient strength for reasonable length of life. Forethought in changing screens before they have completely failed effects great savings in loss of time from shut-downs, and in continuous uniform separation.

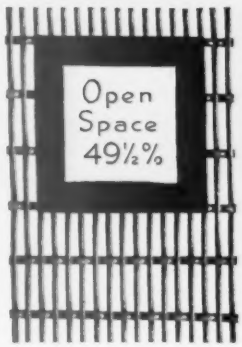
"Perfect" Double Crimped Wire Screens offer a choice of practically 1,000 openings, from 4 inches wide spaces to openings .003 inch in width.

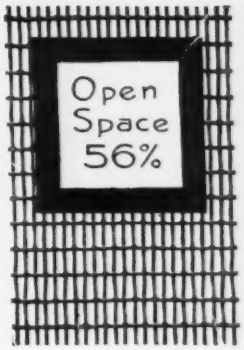
Any opening may be secured in any one of several weights and weaves of standard grades of screens.

ASK FOR CATALOG NO. 6 and samples of the different screens that have the opening you require.









THAT WILL DO IT BETTER!

STUDY YOUR SCREEN SURFACE

The illustrations shown above depict eight screens of different weights and weaves; but all of them have openings .048 inch in width.

How much of your screen surface is active, open space?

Where the angle of flow will permit, or where the feed is granular or flakes or fingers are permissible in the fines, REK TANG Rolled Slot Screens by far excel in tonnage and in service.

For closer sizing, Perfect Double Crimped Wire Screens afford the widest possible range for discriminative selection.

Note the illustrations at top of page. Samples of these screens will show their relative values for capacity, durability, rigidity or any other screen requirements.

Catalog No. 46 is a Text-Book on Screens. Over 1,000 grades of woven screens are listed in this Catalog. The comprehensive tables and full-size illustrations offer the fullest possible information for discriminative screen selection.*

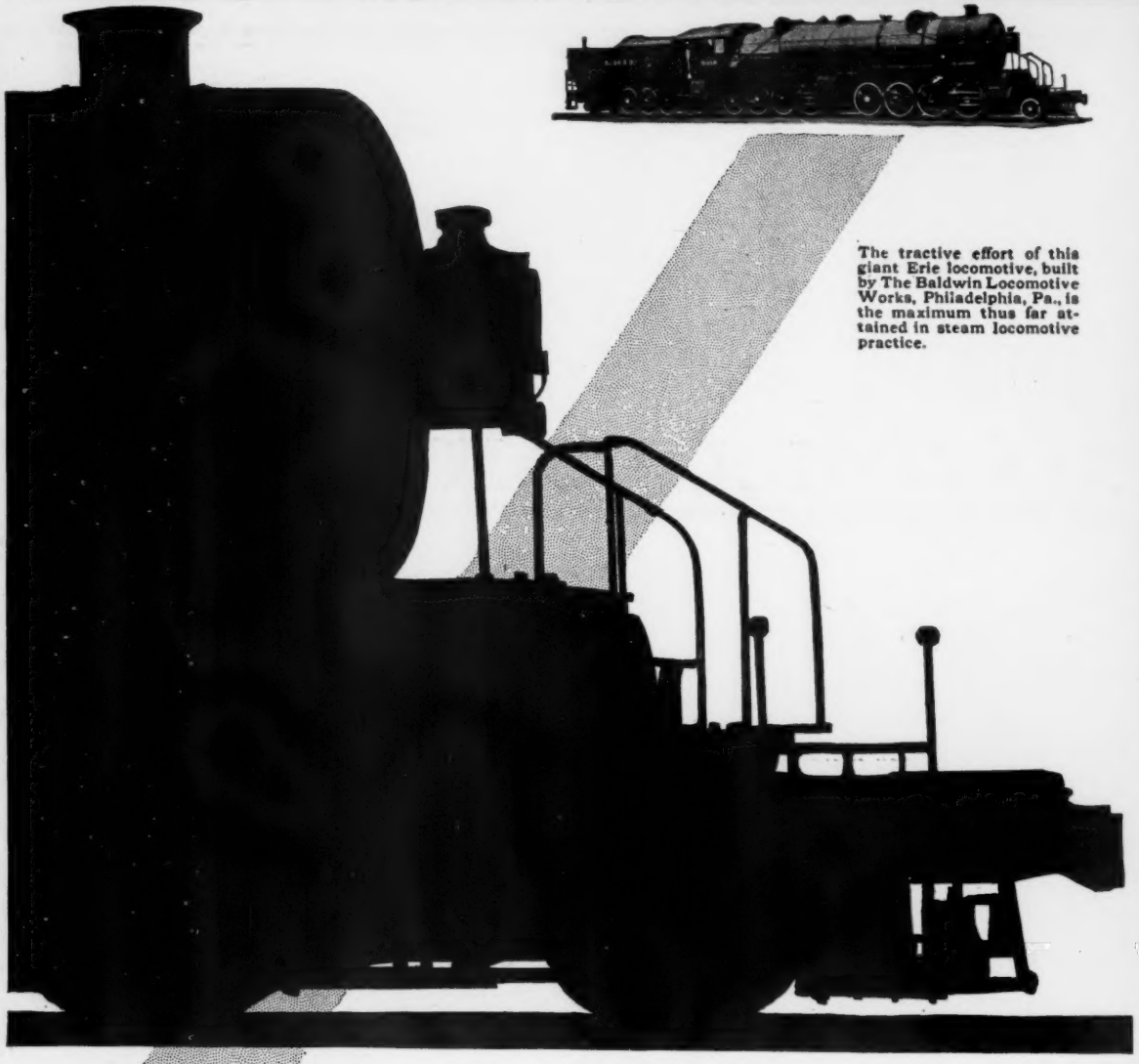
Send for your Copy—Free to all users of Screens

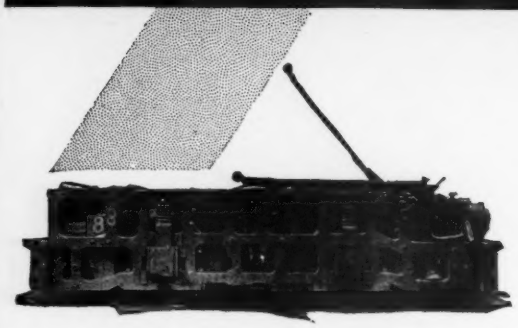
THE LUDLOW SAYLOR WIRE CO.

600-640 South Newstead Ave.,
St. Louis, Mo.

*** Digests of this information also appear in the Keystone Mining Catalog for 1923.**

The tractive effort of this giant Erie locomotive, built by The Baldwin Locomotive Works, Philadelphia, Pa., is the maximum thus far attained in steam locomotive practice.





Baldwin-Westinghouse
Barsteel Trolley-Type
Mine Locomotive.

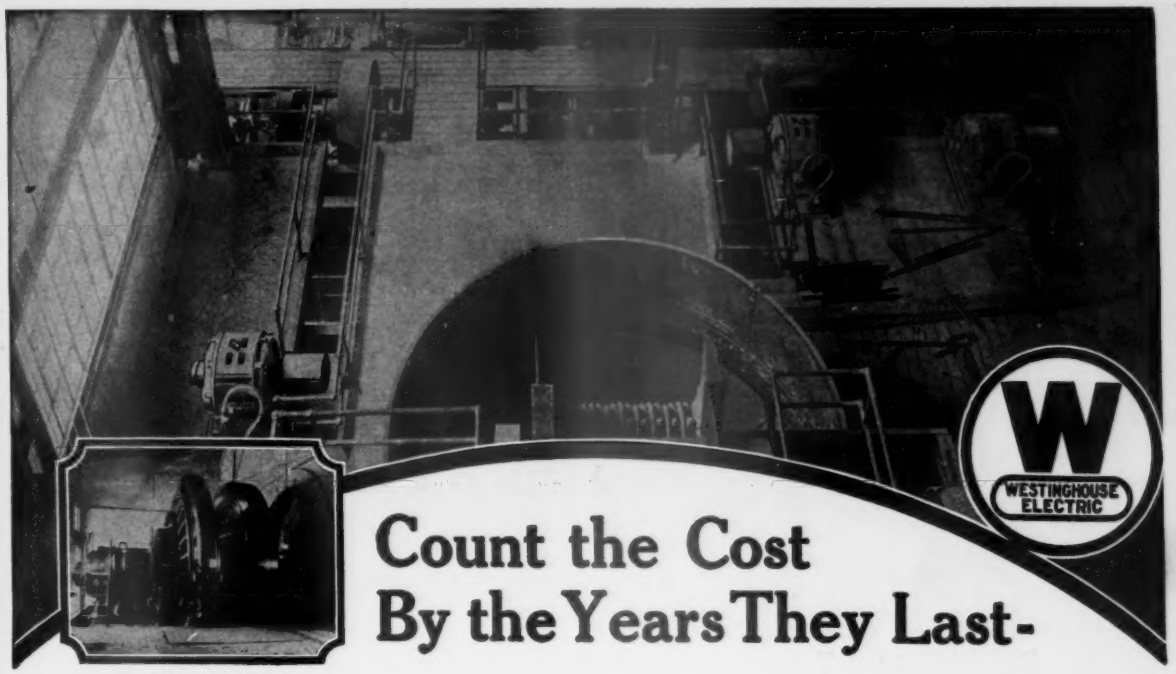
Reassuring indeed is the thought that your BALDWIN-WESTINGHOUSE Barsteel Mine Locomotive is the product of the joint efforts of leading manufacturers in their respective lines.

It is your guarantee of satisfaction.

The Baldwin Locomotive Works
Philadelphia, Pa.

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.

BARSTEEL



The Life of this Motor
Pronounced Indefinite

Count the Cost By the Years They Last-

Pioneer Westinghouse electrolytic synchronous converters are operating as efficiently today as they did when installed 25 years ago.

Two 1500 hp. Westinghouse direct current motors installed in the Pittsburgh district 18 years ago are operating as satisfactorily and as efficiently today as when installed. The condition of the commutators and other wearing parts indicates that they should be operating in 1933, or 1943, as satisfactorily as today. Time may reveal startling facts regarding the life of Westinghouse electrical equipment.

The control used with our pioneer motors has been developed and perfected until it now surpasses the human brain in precision, accuracy and dependability. This development has gone hand in hand with the perfection of other Westinghouse electrical equipment for the metal mining industry. The line is comprehensive—covering every electrical need.

Time is still too short to reveal the life of Westinghouse electrical apparatus. Count the cost by the years they last.

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.

Electrical apparatus retains its high initial efficiency to the very end of its useful life

Westinghouse

"There She Blows"

There's one big outstanding thing about the FEDERAL ELECTRIC SIREN that appeals to every man interested or engaged in mine work.

He KNOWS that the FEDERAL ELECTRIC SIREN can be heard for miles around—that its distinctive cry, ranging from a low guttural growl to a shrill shriek, will get attention instantly. It is never confused with any other signal about the mine.

You need this dependable signal in your mine. With the FEDERAL ELECTRIC SIREN there's no chance for the old alibi, "I didn't hear the whistle." A push of the button from any of several convenient points sends its call to every man at home, or on the property. It tells them when there are cars to load. It gets them to work on time.

Scientifically made—built for years of service—requires little attention. An occasional oiling is all that is necessary. Let us tell you what the FEDERAL ELECTRIC SIREN will do for you. Mail coupon or write us today. No obligation.

FEDERAL ELECTRIC SIREN

Approved by the Underwriters Laboratory of the National Board of Fire Underwriters — Guide 380-12. Approval dated Oct. 11, 1918.

Federal Electric Co.,
8700 So. State St.,
Chicago, Ill.

Please send full information with prices on Federal Electric Siren for our Class of Current, Volts.....
Cycle..... Phase..... or Volts D. C.....
Our men live..... miles from the mine. Company name.....
Street No.....City..... State.....
My name.....

(AMC-9)

What Are Your Fuse Blows Costing You ?

Production figures show as low as $1.00 and over $1,000.00. Investigate the Fuses with the Long-time element—Less Wattage loss—Maximum protection at minimum costs.

FEDERAL ELECTRIC CO.

8700 South State Street, CHICAGO, ILL.

130 West Forty-second St., New York City

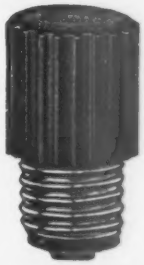
BRANCHES IN ALL LARGE CITIES

91 New Montgomery St., San Francisco, Cal.

A Complete Line of Powder-Packed Time-Limit Renewable Fuses

FEDERAL National MULTIPHASE TIME LIMIT·POWDER PACKED RENEWABLE FUSE

Federal-National Multiphase Time Limit Powder-packed Renewable Fuse. The only absolute protection for multiphase motors and circuits.



FEDERAL "THREE-THIRTY" TIME LIMIT·POWDER PACKED RENEWABLE FUSE PLUG

The Federal Three-Thirty Powder-packed Time Limit Renewable Fuse Plugs, National Cartridge Type for small motors, heating apparatus, mercury arc lamps and rectifiers.

FEDERAL National TIME LIMIT·POWDER PACKED RENEWABLE FUSE

The Federal-National powder-packed renewable cartridge fuse, safe, economical, absolutely reliable for D. C. and single-phase protection.

WE believe that convention exhibits mean more than just opportunities for a manufacturer to show his wares.

Naturally he is concerned with this angle of the exhibit, but there is that other thing that helps to make your and our contact more pleasant—a better understanding of each other.

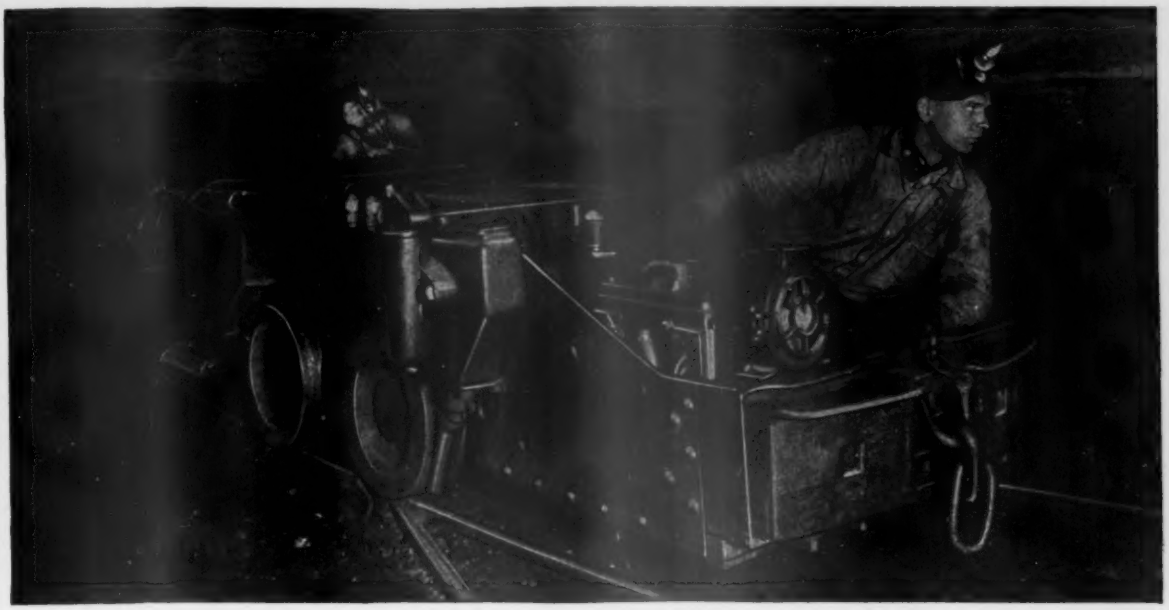
Not only will we be present with our usual exhibit at Milwaukee, September 24-29, for the American Mining Congress, but we also hope to have you carry away the thought that O-B is trying to work with you for better electric haulage.

We expect to profit at Milwaukee by a better understanding of your electric haulage problems—and we hope that you will get better acquainted with our aims. If we meet on that ground we both will better understand each other.

Our booth will have no railing—and we count on the pleasure of greeting you!

The Ohio Brass Co.
Mansfield, Ohio, U.S.A.

New York Philadelphia Pittsburgh Charleston, W Va Chicago Los Angeles San Francisco Paris, France
Products: Trolley Material, Rail Bonds, Electric Railway Car Equipment, High Tension Porcelain Insulators, Third Rail Insulators

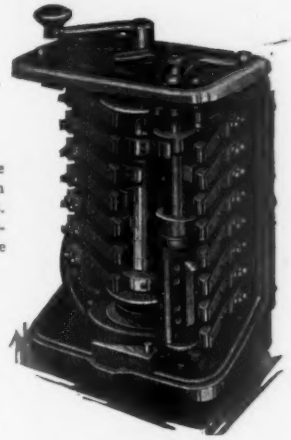


The 3-Way Switch Inside the Controller

Top of Controller, showing Reverse and Switch Handles.

Built into the controller, of the same finger construction and assured the same protection as other parts, the 3-Way Switch of the Type 30 Gathering Locomotive is operated—as it should be—by a controller handle.

So the switch handle is in logical position, for quick and easy use to throw the power connection to gathering reel or either of two trolley poles.



3-Way Switch above Reverse Drum and on same shaft with it. Fingers interchangeable throughout the controller.

Burned switches eliminated.

Motorman protected against being burned by the flashes of the old open-type switch.

Cab room increased by putting the switch inside the controller, where it occupies no extra space.

This is just one of the many good features — small and large — found exclusively in Goodman Gatherers. Book 220-M tells more about them. It is sent on request.

(35)

GOODMAN MANUFACTURING COMPANY

PITTSBURGH
CHARLESTON, W.VA.
ST. LOUIS DENVER

4746 to 4854 South Halsted Street
CHICAGO, ILL.

CINCINNATI
HUNTINGTON, W.VA.
BIRMINGHAM

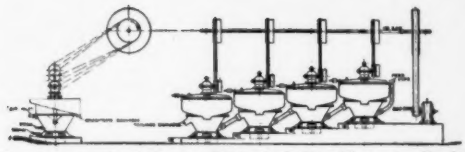
JONES-BELMONT
FLOTATION MACHINE

Patented

J. B. 5-foot Cast Iron Flotation Machine

An improved cell combining the advantages of both pneumatic and mechanical agitation designed to insure perfect circulation of the pulp at all times

Bulletin 1822



Arrangement of Jones Flotation Machines in Series

See This Machine In Operation

Booths 96-97-98

Mining Congress Convention

Milwaukee, Wis.

September 24th to 29th, Inclusive

ALLIS-CHALMERS PRODUCTS
Flour and Saw Mill Machinery
Power Transmission Machinery
Pumping Engines-Centrifugal Pumps
Steam and Electric Hoists
Air Compressors - Air Brakes
Agricultural Machinery
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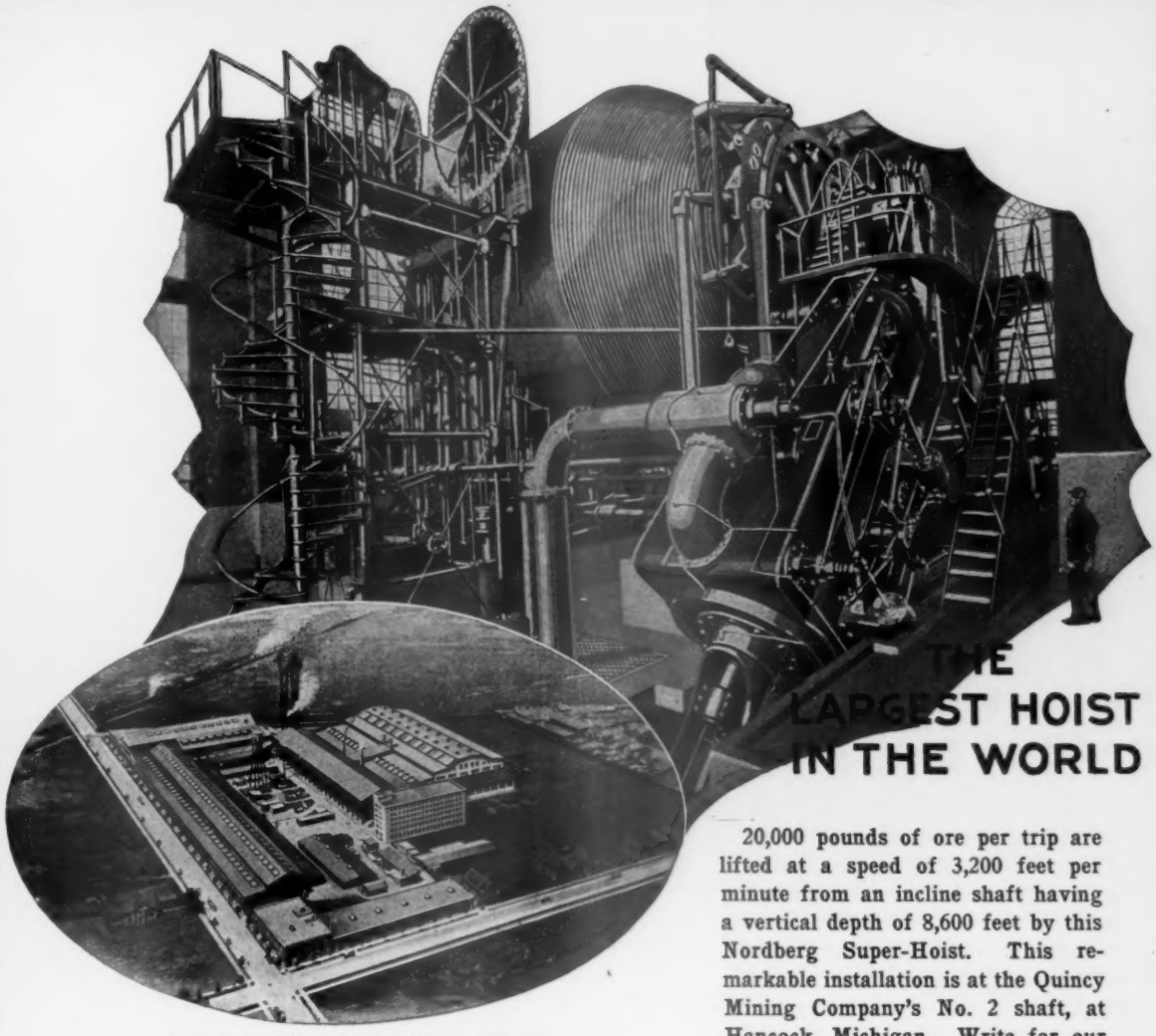
MILWAUKEE, WISCONSIN, U.S.A.

ALLIS-CHALMERS PRODUCTS
Electrical Machinery
Steam Turbines
Steam Engines
Gas and Oil Engines
Hydraulic Turbines
Crushing and Cement Machinery
Mining Machinery



Aeroplane View of Nordberg Works

THE LARGEST HOIST IN THE WORLD

20,000 pounds of ore per trip are lifted at a speed of 3,200 feet per minute from an incline shaft having a vertical depth of 8,600 feet by this Nordberg Super-Hoist. This remarkable installation is at the Quincy Mining Company's No. 2 shaft, at Hancock, Michigan. Write for our Bulletin No. GS-4.

NORDBERG MACHINERY

MINE HOISTS
UNIFLOW ENGINES
CORLISS ENGINES
BLOWING ENGINES
CONDENSERS
COMPRESSORS
DIESEL ENGINES
SPECIAL MACHINERY

Nordberg Air Compressors, for years a "standard of comparison" among metal mines, need no introduction to the Mining Profession. The largest reciprocating compressor built in the United States is a Nordberg and is used for mining operations. Write for our bulletin No. GS-5.

Nordberg Two Cycle Diesel Engines are widely used for mining service. The four 2,000 B. H. P. Nordberg Diesels installed for a prominent mining company are the largest stationary engines built in this country. Write for our Bulletin No. GS-3.

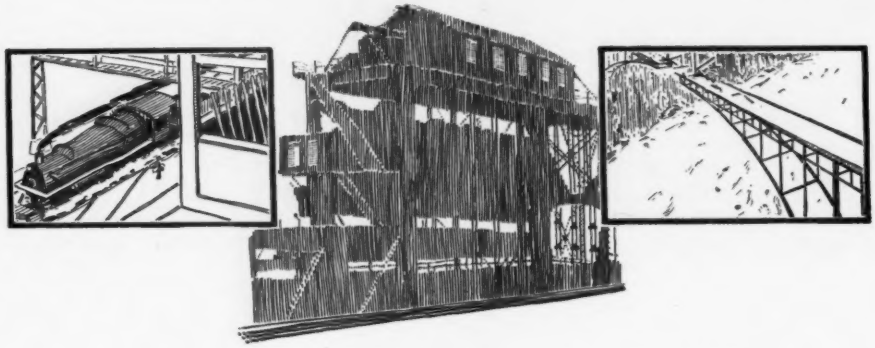
An invitation is extended to all delegates attending the American Mining Congress to visit the Nordberg Works and note our facilities for building high-grade mining machinery. Ask Nordberg Engineers in booths No. 74 and 75 to tell you more about Nordberg products.

NORDBERG MANUFACTURING CO.

Milwaukee *Wisconsin*

NORDBERG

SPECTACULAR ACCURACY AND MINE TONNAGE

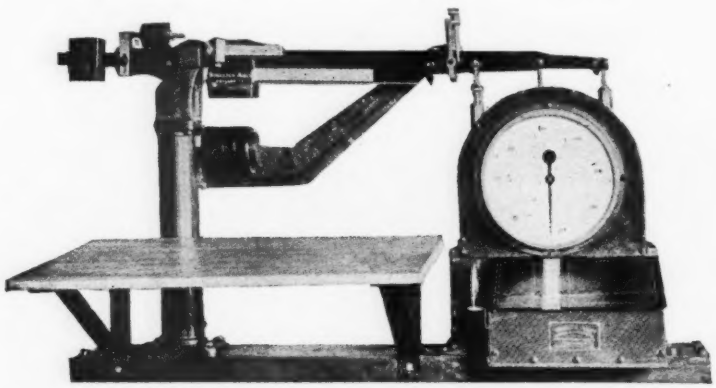


COMPLETE ACCURACY is commonly thought of in terms of the spectacular—train schedule maintenance—engineering feats—science; but it probably is nowhere economically of more importance than at the source of our daily necessities.

TONNAGE IS THE MEASURE OF ALL PROFIT OF A MINE. AUTOMATIC accuracy and speed in weighing are vital factors of economy. STREETER-AMET AUTOMATIC WEIGHING MACHINES record the weight of moving trains, eliminate chances to forget, reduce your tipple force. They eliminate the element of error.

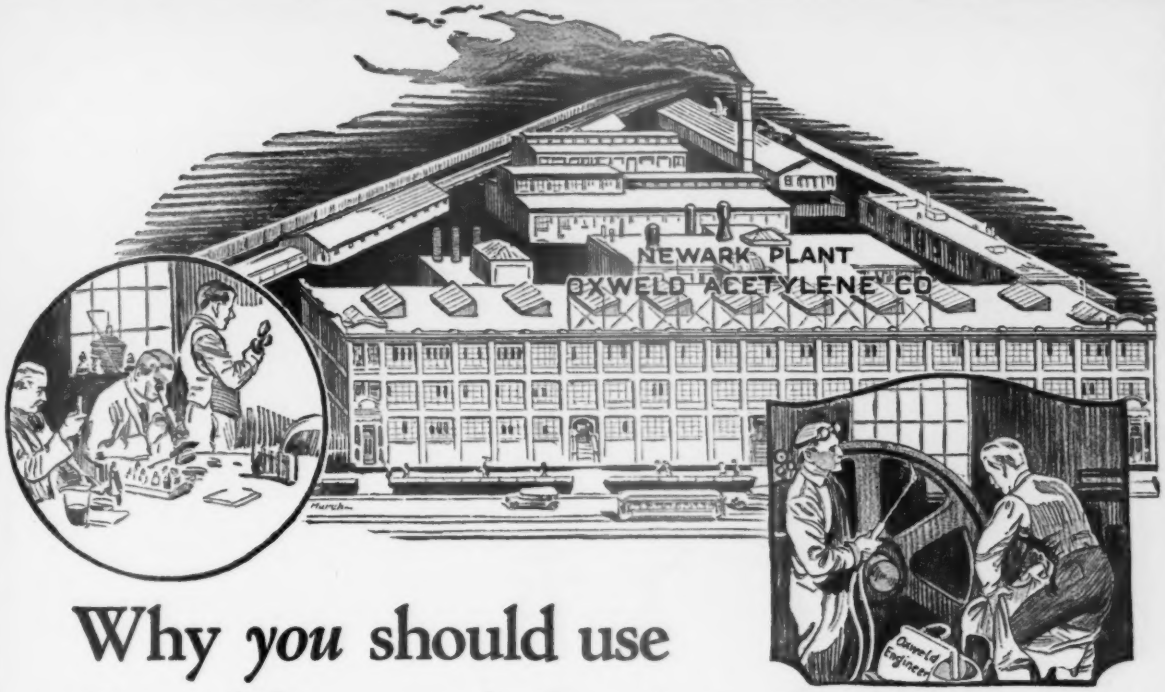
STREETER-AMET AUTOMATIC DIAL AND WEIGHT RECORDING MACHINES

Accurate Daily Records Save Thousands Yearly



Send for booklet describing the many economies they will work for you.

STREETER-AMET WEIGHING & RECORDING CO.
CHICAGO, ILLINOIS.



Why *you* should use *Oxwelding* and Cutting Equipment

When you install Oxweld Welding and Cutting Equipment you put into your plant far more than highly efficient apparatus.

You automatically open up to your plant or shop all the possibilities of the oxy-acetylene process itself.

Our interest in you does not cease after you buy an Oxweld equipment. We constantly advise and assist Oxweld users. We want you to get full measure of efficiency from your outfit and to extend its use to the limits of known possibilities. The Oxweld organization, the largest of its kind in the world, makes this possible.

Oxweld Resident Engineers, in over fifty cities, will study and advise on your individual needs. You get the benefit of latest economical practices as encountered in the entire field or developed in our factories and laboratories.

The oxy-acetylene process is marvelously flexible and undoubtedly will fit into a score of places in production, repair or salvaging now unrealized by you. We stand ready to give you freely full benefit of our knowledge.

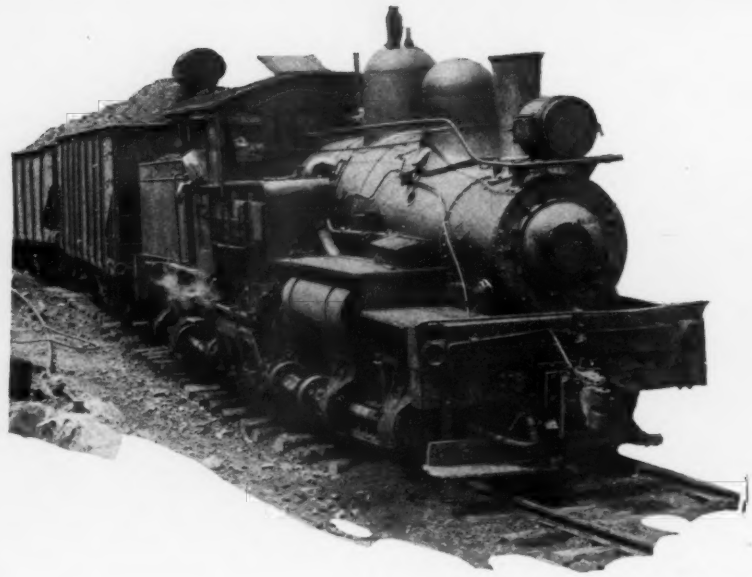
OXWELD ACETYLENE COMPANY

Newark, N. J. Chicago San Francisco

Oxweld

WELDING AND CUTTING APPARATUS

World's Largest Manufacturers of Welding and Cutting Equipment



Hasn't Lost a Day In Four Years

FOUR years ago, a well-known mining company added a 50-ton Shay Geared Locomotive to its equipment.

This Shay has been used continuously since its purchase without the loss of a day's service for repairs.

There is nothing exceptional about this Shay performance—it's typical of the service of this rugged grade-climbing, heavy-hauling locomotive. Give a Shay only ordinary maintenance attention and it is good for years and years of the hardest kind of work.

Drop us a line and we'll tell you more about the Shay and why it is a most satisfactory, all-around locomotive for mining and stripping purposes.

LIMA

Shay Geared LOCOMOTIVES

LIMA LOCOMOTIVE WORKS
INCORPORATED

Lima, Ohio — 17 East 42nd Street, N. Y.

SKF

Ball Bearings Better Performance
of Coal Mining Machinery of All Kinds

THE continuous non-interrupted performance of mining equipment which is so essential to economical production cannot be realized if bearings run hot and wear, causing the settings of rotating parts to be disturbed with possible damage to important machine elements as well.

Because of the protection given against such losses by **SKF** marked self-aligning ball bearings they have met with extensive use on mine locomotives, pumps, fans and motors; on coal cutting and loading machinery; on steam turbines, electric generators and air compressors; and on breaker and tipple machinery of all kinds.

Protected against dust and grit by sealed housings and having the principle of the ball and socket joint embodied in the bearing itself, two rows of chrome steel balls roll practically frictionless and free from noticeable wear between hard steel races. Lubricant is only required at infrequent intervals and bearing adjustments are unnecessary.

May our engineers co-operate in bringing these advantages to your machines?

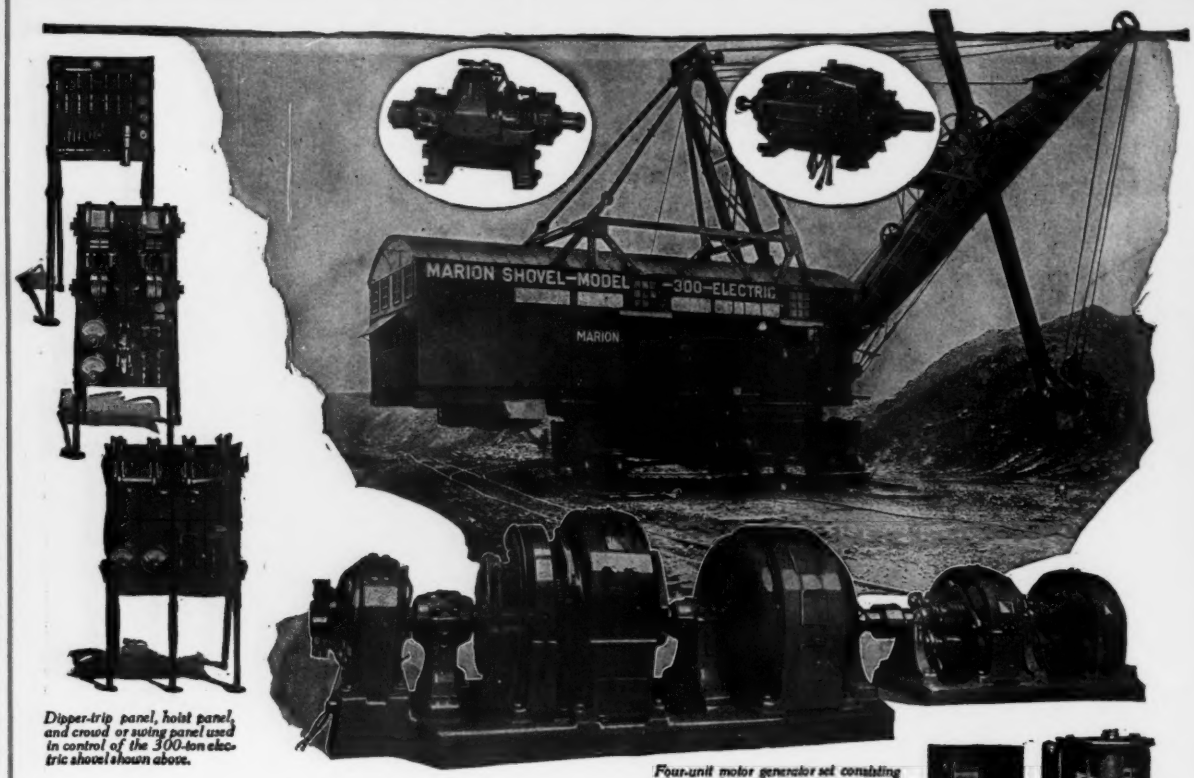
THE SKAYEF BALL BEARING COMPANY

Supervised by **SKF** INDUSTRIES, INC., 165 Broadway, New York City

935

Normal View *Deflected View*

BALL BEARINGS
The Highest Expression of the Bearing Principle



Dipper-trip panel, hoist panel, and crowd or swing panel used in control of the 300-ton electric shovel shown above.

Four-unit motor generator set consisting of a synchronous motor, exciter, and three direct current generators.

Foot-operated master switch for controlling swing motor.

Hand-operated master switch for controlling the crowd or hoist motor.

Bigger bites at less cost with the electric shovel

THE electric shovel has become an immense factor in mining and excavating. Coal veins too close to the surface for safe shafting, yet too deep for old-method open-cut mining are being stripped electrically with very profitable results. Open-cut limestone quarrying, once sluggish, now can keep pace with milling and loading. Bulk loading and big-scale digging can be done nearly twice as fast and at about half the old cost.

The 300-ton electric shovel, illustrated above, operates with greater power economy and fewer men—and cuts deeper over a wider radius than any predecessor.

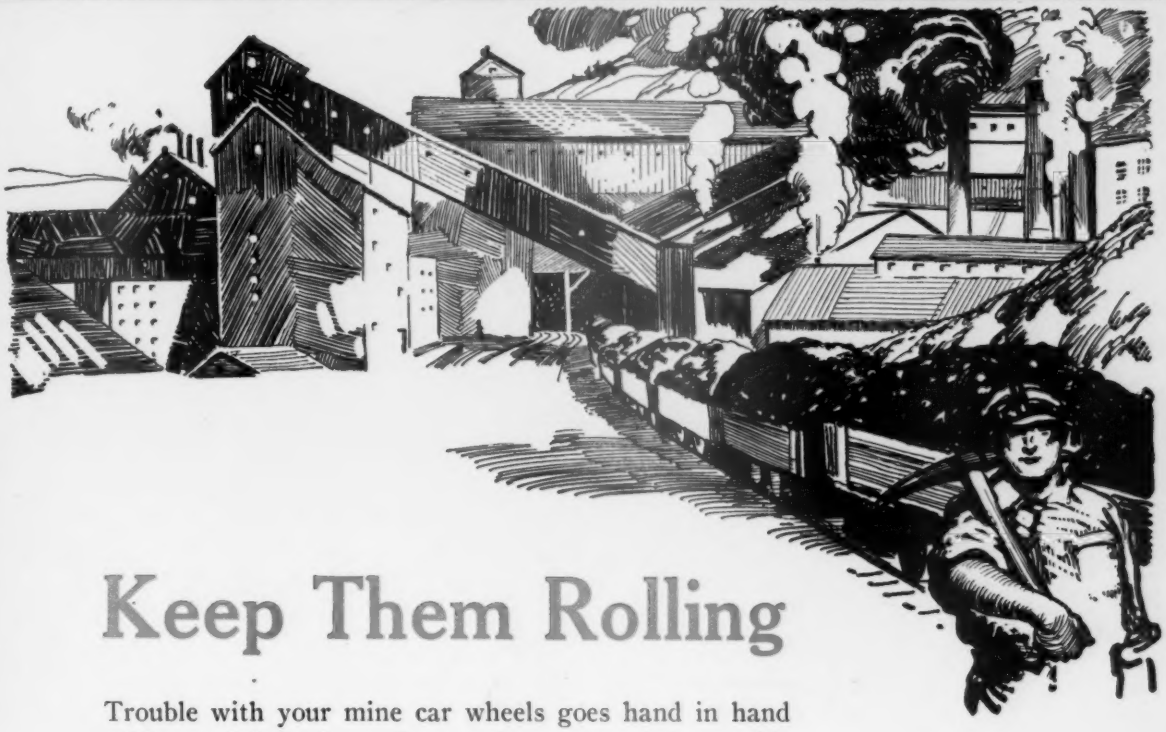
All the electric equipment except the crowd motor on the boom, is located in the 50 x 22 foot cab. This equipment consists of one four-unit motor generator set with direct-connected exciter, two hoist motors geared to a common shaft, one swing, one crowd, and one dipper trip motor.

G-E engineers, experienced in design and manufacture of electric equipment for shovels, offer capable co-operation to manufacturers. Ask the nearest G-E office for further information.

General Electric Company
Schenectady, N. Y.
Sales Offices in all Large Cities

GENERAL ELECTRIC

438-595



Keep Them Rolling

Trouble with your mine car wheels goes hand in hand with poor lubrication. Correct the cause and the trouble will vanish.

The cause is chiefly a type of lubricant that will not stay in the wheel bearings; the remedy is a semi-fluid grease of unchanging density. It should be of high lubricating value, impervious to water, and free from ingredients that clog and cake.

Such a lubricant is found in Keystone Grease No. 119 density medium, intended for equipment in good condition, and Keystone Grease No. 119 density heavy and Keystone Grease No. 119 density extra heavy for worn equipment.

Hyatt Roller-Bearing mine car wheels will operate for six months or more on one application of Keystone Grease No. 119 heavy. For solid roller-bearing mine car wheels Keystone Grease No. 2 density is recommended.

Keystone Grease makes the most efficient mechanical unit more efficient.

Write and ask us what our guarantee and our service department will do for you.

THE KEYSTONE LUBRICATING CO.

New York
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Montgomery, W. Va.
Cincinnati
Knoxville
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Executive Office and Works:
21st and Clearfield Streets,
Philadelphia, Pa.
Established 1884

Chicago
Detroit
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Agencies in Principal Countries Througout the World

KEYSTONE
GREASE
The Master Lubricant
TRADE MARK REG. U.S. PAT. OFF.

Maybe you need to make an about face in GEARS

Much of the efficiency of mining machines hinges on your gears. Interruptions to service are more frequent than they need be.

Why not supplant the gears you have been using with Nuttall B. P. Mining Gears? They are guaranteed to outlast untreated gears four times over.

The screw-like operation of Nuttall B. P. Helical Gears permits the gear teeth to slip under all loads easily, gradually and smoothly. This absence of vibration prolongs the life of mining machines, and insures more efficient operation. There is a Nuttall Gear for every type of mining machine.

Send for our mine specialist or let us send you explanatory data.

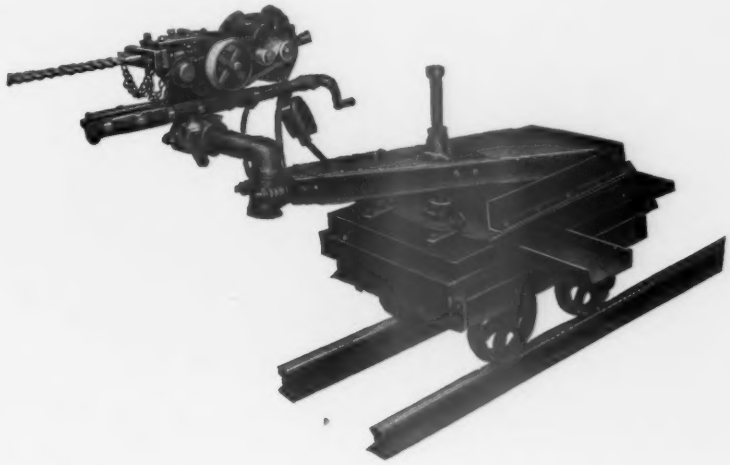
R.D.NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

Philadelphia Office: 420 Land Title Bldg.
Chicago Office: 2133 Conway Bldg.

Nuttall

BP "TOUGH-HARD" R.D.NUTTALL CO. Pittsburgh, Pa. MINING GEARS

THE FORT WAYNE ELECTRIC ROCK DRILL



With Boom Mounting

Solves your drilling problems with big saving in time, labor and cost.

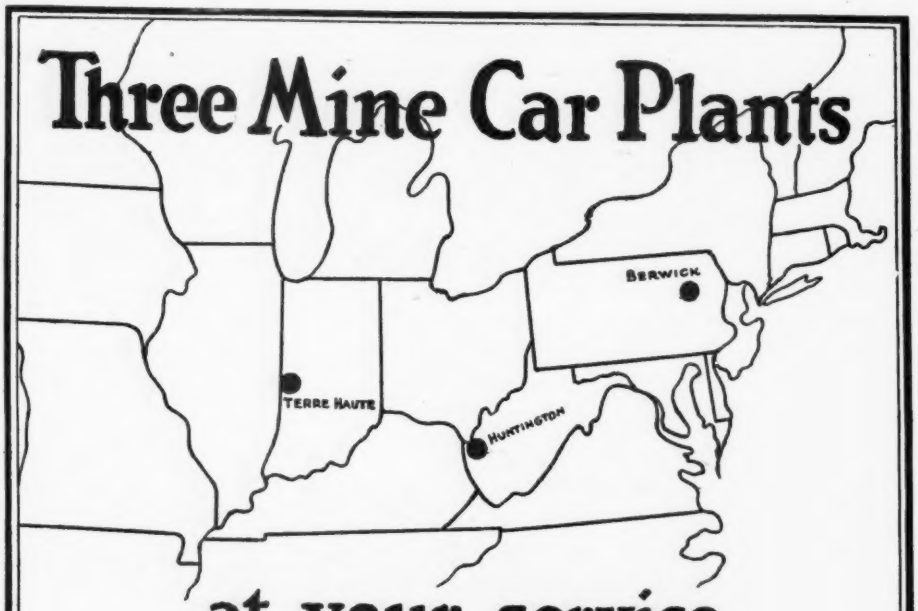
See our Exhibit in
Booth 89

DIAMOND MACHINE COMPANY, MONONGAHELA, PA.

Sales Representatives

Cooke-Wilson Electric Supply Company, Pittsburgh, Pa., Charleston, W. Va., and Athens, Ohio.
Scranton Electric Construction Co., Scranton, Pa.
Electric Coal Mining Machinery Company, Chicago, Ill.

Three Mine Car Plants



at your service

All types of cars—wood, steel, and composite—can be furnished according to our designs or to your own specifications—cars with plain or roller bearing wheels, tight or loose axles; cars with journal box bearings; cars with swing or lift ends; cars with tight (solid) ends; cars with spring draft gear designed to turn on shank; etc.

Other products include car parts, chilled cast iron wheels, bar iron and steel, bolts, nuts, rivets, iron-body gate valves, flanged pipe, electric rivet heaters, railway freight and passenger cars.

Always get a "Car Foundry" quotation

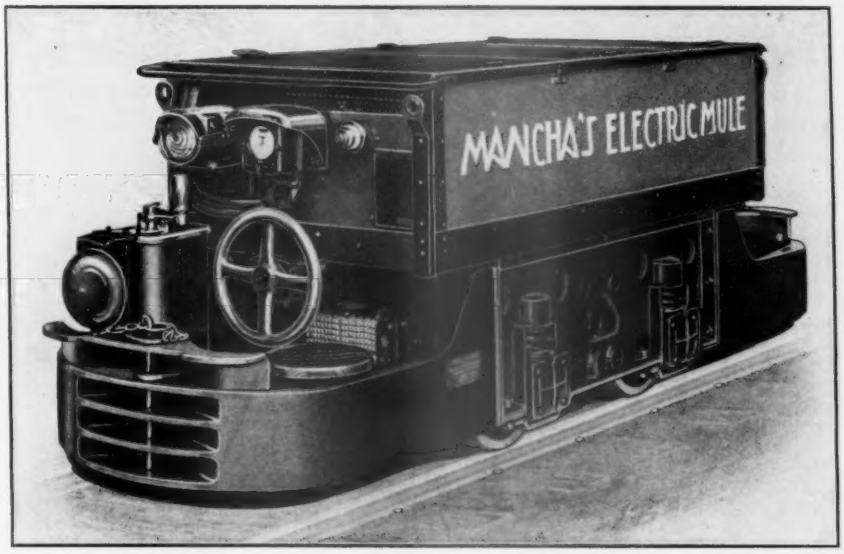
American Car and Foundry Company

165 Broadway, New York

Chicago New York St. Louis

Your Profits

Do Not Depend On What You Receive For Your Output But On What You Pay To Get It Out



A Radical Statement! But you know definitely that your selling price depends on the market, whereas your production costs depends on the equipment you use to handle your output.

One of the large factors in modern mining methods is the haulage method employed and to this end mining engineers have developed the storage battery locomotive. This method has long since superseded the old-time method of animal haulage with its attendant disadvantages. Storage Battery Locomotives in general and Mancha's Electric Mules in particular have done much to alleviate haulage worries in many of the largest mines in the country. This includes metal as well as coal mines.

We have some very interesting facts for the asking.

Our representatives are located in all large cities of the country; any one of whom will be more than pleased to study your haulage conditions. Each and every one has practical experience in the solving of haulage problems and will tell you frankly what method would most nearly meet your requirements. This engineering service is given you without obligation! May we not have the pleasure of serving you? Now is the time! A line to our home office will put you in touch with our nearest engineer.

MANCHA STORAGE BATTERY LOCOMOTIVE COMPANY

St. Louis, Mo.

To Our Clients

And those who are to become our clients

The mine executive who has an appraisal of his properties is entitled to know how that appraisal is made—what the appraiser's facilities are—how the appraisal organization is equipped in personnel and statistical resources and experience to elevate the valuation from the personal opinion class and make of it a statement of fact.

The American Appraisal Company welcomes, therefore, the opportunity accorded it at the forthcoming convention of The American Mining Congress to lay before the mining men of the nation in a tangible way its facilities and methods.

At one of the sessions of the Tax Section, Mr. W. I. Kircaldie, Chief of our Engineering Staff, will talk on "The Determination of Invested Capital, Depletion, and Depreciation for Federal Tax Purposes." At Booth 112 in the main auditorium our representative will be instantly on hand to answer questions and aid you to a more complete understanding of valuations and their application to your particular problems.

During the course of the convention our main offices will be open for your inspection. You are cordially invited to visit us during your stay in Milwaukee.

The American Appraisal Company

165 Michigan St., Milwaukee, Wis.

ATLANTA	CLEVELAND	MINNEAPOLIS	SAN FRANCISCO
BALTIMORE	DETROIT	NEW ORLEANS	ST. LOUIS
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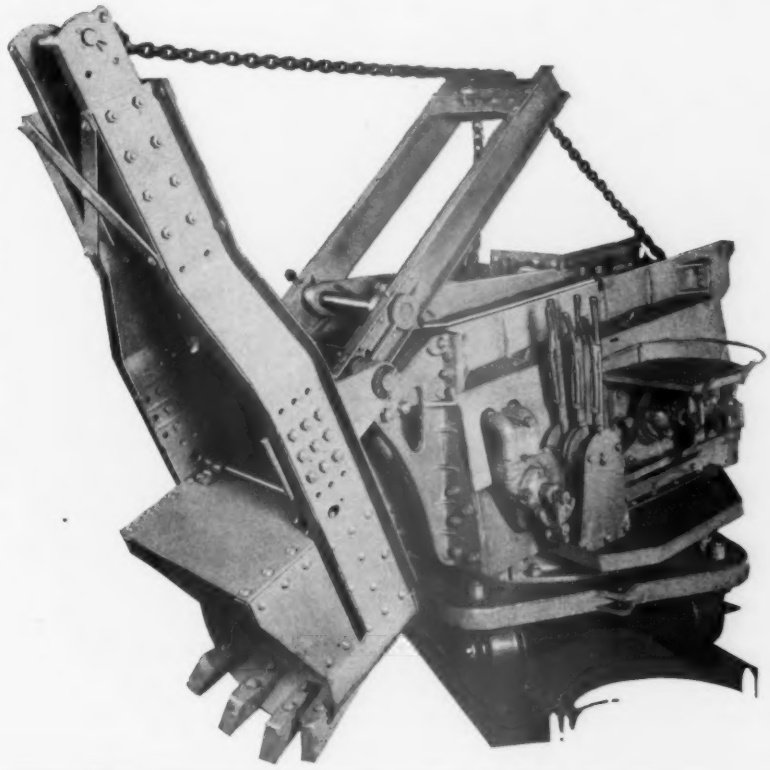
C 1923 The A. A. Co.

BOOTH
37

MILWAUKEE **SEPT. 24-29**



NINE YEARS OF MECHANICAL LOADING experience is at your disposal. The mine equipped with Hoar Shovels, properly applied, is on the most efficient basis obtainable today. Labor costs are reduced, operating and maintenance costs are lowered, and tonnage output made more certain.

Reliable	**Compact**
Economical	**Simple**
Low Maintenance	**Safe**

A prominent Western user has said:

"It is the greatest piece of shoveling mechanism there is."

Call around and get acquainted!
See the shovel in action!
Ask all the questions you wish!

We'll be glad to see you.

HOAR SHOVEL CO.
DULUTH
MINNESOTA

CLIP THIS COUPON AND MAIL IT!

MAIL TO .....
Name .....
Address .....
HOAR SHOVEL
BULLETIN
M-163.

BABY
HOAR
SHOVELS

WIRE

electrical, rope, barbed, plain, nails, tacks, spikes, bale-ties, hoops, springs, netting, wire fences, steel posts, steel gates, trolley wire, rail bonds, flat wire (strip steel), piano wire, horse shoes, round and odd-shape wire, screw stock, concrete reinforcement. Aerial Tramways.

Illustrated books describing uses, free

American Steel & Wire Co.

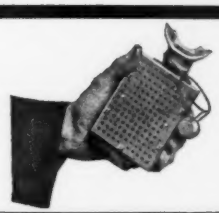
CHICAGO **NEW YORK**

Four New Steps Toward Safety

The past year has seen the development of four important steps in mine safety work, dealing with protection against afterdamp of mine fires and explosions.

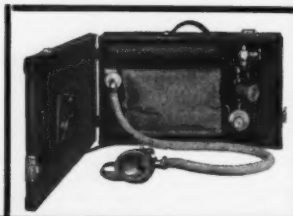
Mine Safety Appliances Co.

Chamber of Commerce Bldg. Pittsburgh, Pa.

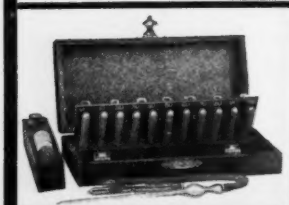


SELF RESCUER
"With This a Miner Can Rescue Himself"

McCAA OXYGEN BREATHING APPARATUS
½-Hr.-Type With Automatic Admission Valve and Refillable Regenerator.



THE PYROTANNIC DETECTOR
Detector for the Rapid Determination of Carbon-Monoxide in the Blood.



H. H. INHALATOR
For Administration of Carbogen to Persons Overcome by Gas or Electric Shock.

Examine them and see them demonstrated at our booth at the Mining Congress Exposition, Booth No. 104.

More tons per pound of explosives

THAT is the objective of du Pont Explosives Service. It is saving thousands of dollars for operators and contractors the country over.

There is a du Pont explosive that will do *your* work best at least expense.

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Explosives Department
Wilmington Delaware

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The du Pont Chemical Engineer—symbol of progress and leadership in the manufacture of products based on Chemistry.

"Exhibitor National Exposition of Mines and Mine Equipment of the American Mining Congress, Booth 62, Arena of the Milwaukee Auditorium, Milwaukee, Wisconsin, September 24 to 29, 1923."

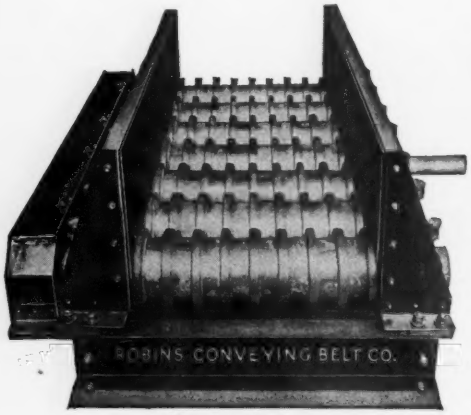
EXPLOSIVES ~ SERVICE

ROBINS

Standard Equipment for Mine, Mill and Smelter

Belt Conveyors of various types
Belt and Bucket Elevators
Bin Gates—Rotary Grizzlies
Ore Bedding and Reclaiming Machines
Skip Hoists—Shaking Screens

Material handling systems complete with all accessories



Patents applied for

Almost every crushing plant has at least one location in its flow sheet where the load to a crusher may be eased by using a ROBINS CATARACT GRIZZLY for scalping.

Machines built to handle up to 1,000 tons per hour and to make any desired separations between 1″ and 6″.

Write for Handbook of Conveyor Practice

ROBINS CONVEYING BELT CO.
15 PARK ROW, NEW YORK CITY

CHICAGO PITTSBURGH BOSTON

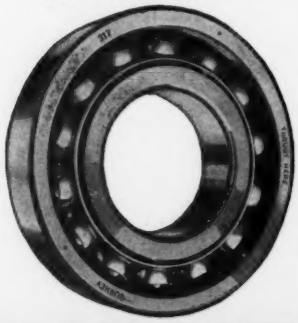
Gurney Ball Bearings Are Better

Their Greater Load Capacity (for their size) than other bearings makes Gurneys best for replacement work.

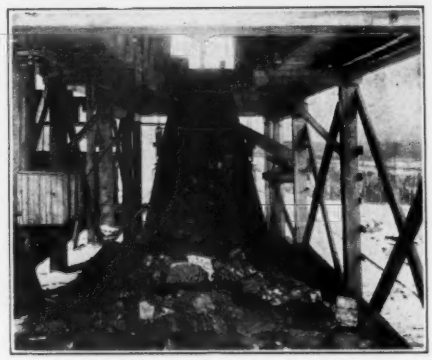
The new pressed steel separator, recently adopted after years of trial, adds the final touch that places Gurney Bearings in the foremost position.

Let our Engineers assist you.

Gurney Ball Bearing Co.
402 CHANDLER ST.
JAMESTOWN, N. Y.



GURNEY
BALL BEARINGS



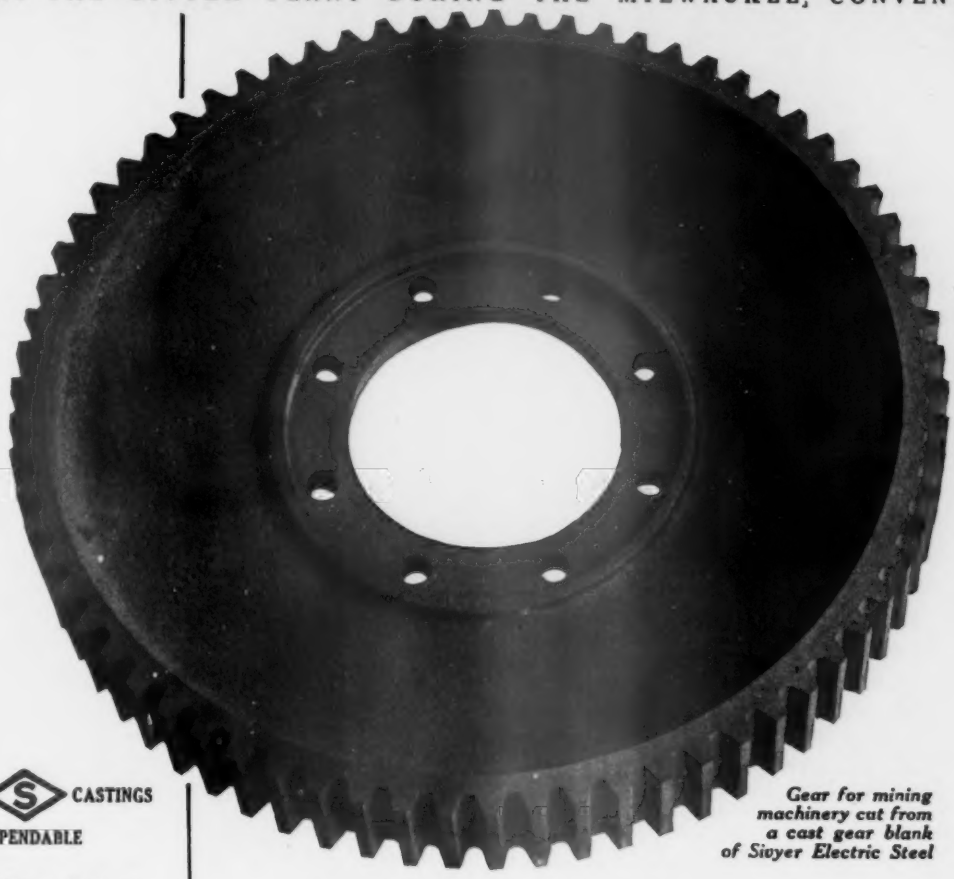
LOADING BOOMS
COAL TIPPLES

Cleaning of Coal by the Dry Process are R and S specialties

Submit your coal preparation problems to us without obligation.

ROBERTS AND SCHAEFER CO.
ENGINEERS AND CONTRACTORS - CHICAGO, U.S.A.

VISIT THE SIVYER PLANT DURING THE MILWAUKEE CONVENTION



Gear for mining machinery cut from a cast gear blank of Sivyer Electric Steel

SIVYER S CASTINGS

DEPENDABLE

Send Blue Prints

If certain parts of your product—which are now either cast or hammer-forged and welded—ought to be more effectively safeguarded against failure in service, send us your blue prints with an explanation of your difficulties. We will be glad to study the problems involved and recommend possible solutions without obligation on your part.

If some of your planing and boring tools require an unusual amount of grinding and replacement, it may be that there are sand and slag on the surface of some of the castings now used. Tools are keen inspectors of castings and originate many of the orders that come to Sivyer from more than a thousand miles away. If your usual sources of supply seem unable to get rid of the trouble, send us your blue prints of the parts in question, together with details about your difficulties. Without obligation on your part we will study the problems of molding practice involved and suggest methods for producing castings with uniformly good machining quality.

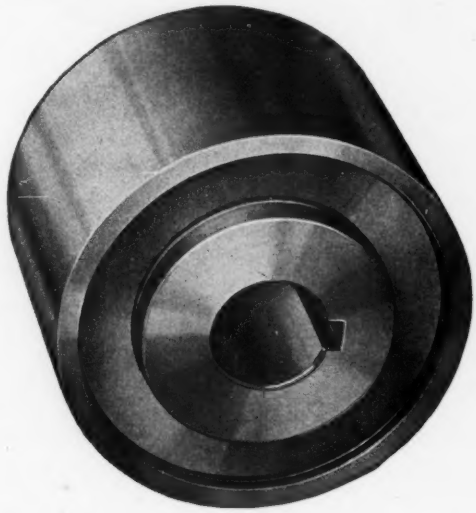
Illustrating Interior and Exterior Integrity

CUT gears, like the one above, illustrate the uniformly honest surfaces and thoroughly sound interior of Sivyer Electric Steel Castings. To show the satisfactory machining costs established by castings like this, the surfaces have to be uniformly free from sand and slag. In addition, the interior of the casting must be free of imperfections — or rejections after partial machining would increase the cutting expense. The low cost of cutting gears from Sivyer blanks is, therefore, most interesting evidence of interior and exterior integrity. It is this uniform honesty that is leading so many manufacturers of mining machinery to use castings of Sivyer Electric Steel to safeguard their product against failures in service.

SIVYER STEEL

SIVYER STEEL CASTING COMPANY, MILWAUKEE

Announcing



To The American Mining Industry

THE Falk Corporation is pleased to announce that it has begun the manufacture and sale of the famous Wellman-Bibby Couplings, for the United States, and will market them under the name of Falk-Bibby Flexible Couplings.

This is a notable step in the consummation of a complete Falk Service for the smoothest and most efficient transmission of power that it is possible to achieve.

What Falk Herringbone Gears have long meant in the reduction and distribution of power, Falk-Bibby Couplings now mean in the true alignment of shafting by means of flexible couplings.

The same general results of service are back of both products; namely, the elimination of shock, friction and wear, and the conservation of power and increased life and effectiveness of machinery which naturally result.

These couplings have been highly successful in many of the great foreign plants. In design and operation they take care of unavoidable misalignments caused at the time of installation, and with equal facility prevent later troubles due to misalignments of operation.

The Falk engineers will gladly study your own plant problems with a view to applying these couplings for the proper lining up of your connected machines.

THE FALK

MILWAUKEE,

REPRESENTATIVES:

W. O. Beyer, 1007 Park Bldg., Pittsburgh, Pa.
F. W. Grimwood, Rialto Bldg., San Francisco, Calif.
M. P. Fillingham, 50 Church St., New York City.
General Machinery Co., Brown Marx Bldg., Birmingham, Ala.

Falk-Bibby

Flexible Couplings

Falk-Bibby Flexible Couplings obtain their flexibility from a tempered steel spring bent into the form of a continuous cylindrical grid to fit into the equally spaced slots of the flanged coupling halves.

An outer shell holds the spring in place, at the same time protecting it from dirt and injury and forming a container for lubricant.

This shell is easily shifted endwise for the removal of the spring.

The slots in both flanges widen inwards, each element of the spring fitting closely only at the outer ends. The sides of the slots are formed to circular arcs of accurate radius.

Between the points of contact on the springs there is a long, free span under light and normal loading. Under overloads these spring elements are supported along the curved sides of the grooves. This shortens the span and results in a progressive increase of stiffness with increase of load.

The stress on the spring is so limited, automatically, that the coupling will safely carry unusual overloads. The coupling has both torsional and lateral elasticity, thus allowing for a reasonable amount of misalignment of shafts.

Falk-Bibby Flexible Couplings are strong—durable—compact — and are conveniently assembled and disassembled. The bearing surfaces are large and, being all metal of the highest quality, there are no unreliable elements to lead to break-down.

For the easy coupling or uncoupling of shafts—for the correction of irregularities due to defective alignment —for the elimination of end-thrusts, oscillations and other damaging actions of power machinery—the Falk Corporation unreservedly recommends these couplings and invites requests for information regarding their use in specific cases.

CORPORATION

WISCONSIN

REPRESENTATIVES:

Vulcan Iron Works, Wilkes-Barre, Pa.
Denver Engineering Works, Denver, Colo.
Engineering Equipment Co., Ltd., 358 Beaver Hall Square, Montreal, Quebec, Canada.

FOREIGN REPRESENTATIVE: Gustav Melms, 3 Rue Taitbout, Paris.

"Boss" and "Dixon" Couplings

VALVES and SPECIAL HOSE FITTINGS
FOR ALL MAKES OF DRILLS

Visit our Exhibit at the
AMERICAN MINING CONGRESS SHOW

This sectional view shows the "BOSS" Coupling attached to Hose. For Rock Drills using either steam or air.

We solicit your inquiries for special couplings and parts

Dixon Valve and Coupling Co.
Emerald and Letterly Streets, Philadelphia, Pa.

"Goodall Semi-Metallic" Hose

Best known for its FLEXIBILITY,
STRENGTH, AND WEAR RESISTANCE.

Examine it at our Booth—now on exhibition.

"G. S. M." Hose has been pronounced superior to any other type by leaders in the mining industry.

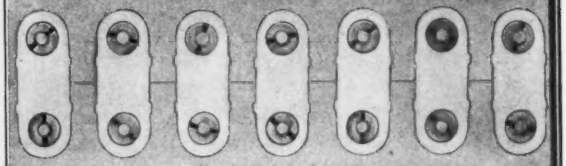
GOODALL SEMI-METALLIC HOSE
AND MANUFACTURING CO.

Station K, Philadelphia, Pa., U. S. A.

FLEXCO

TRADE MARK

"HIGH DUTY" CONVEYOR BELT FASTENERS



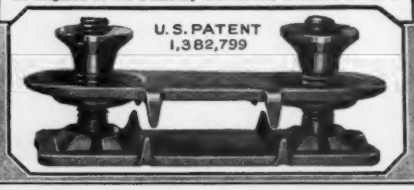
LENGTHENS CONVEYOR BELT SERVICE
Makes a tight butt joint for flat or troughing conveyors from 5-16 inch up to the heaviest conveyor belts made. Has tremendous strength and durability. Is readily applied and in mining, sand and gravel, nitrate and rock products has given longer service than anything previously tried.

A TRIAL OFFER. To any responsible firm we will gladly submit a "make good" offer. **See our display at the Convention. Mr. H. L. Coats in charge, or write us.**

Manufacturers also of famous Alligator Steel Belt Lacing.

FLEXIBLE STEEL LACING COMPANY

4668 Lexington St., Chicago, Ill.
In England at 135 Finsbury Pavement, London, E. C. 2



SEE

THE OIL SHALE EXHIBIT

BY

Colorado School of Mines

Mexico's Mineral Exhibit

U. S. Bureau of Mines Exhibit

NATIONAL EXPOSITION MINES
PUBLIC HALL, MILWAUKEE, WIS.

Our Two Exhibits

One is at the Auditorium. Space No. 111 three ones—easily remembered. Mr. J. K. Mahaffey (Pittsburgh Dist. Mgr.) and Mr. F. H. Foglesong (Chicago Dist. Mgr.) will be there at your disposal

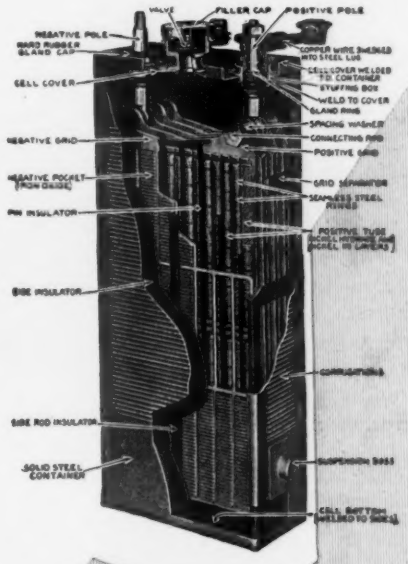
The other? Here it is, below, for all members, including those not going to Milwaukee. The letter is the latest one received of many such.

Storage battery locomotives are designed and built to withstand the extremely rough service of mining work. Their storage batteries should be strong, to assure minimum repairs and maximum number of working days; that is, maximum yearly output at lowest yearly cost per ton mile.

The Edison Alkaline Storage Battery has proved to be the most economical and efficient in mining service. Its all-steel construction, steel plates, steel poles, steel container, enable it to withstand the severe vibration, jolting, etc., due to rough track and frequent coupling. There is nothing to buckle or crack, repairs amount to practically nothing.

Nickel and iron active materials submerged in a non acid solution give the Edison battery a longer life than is possible with batteries of other chemical combinations.

It is light in weight. ❦ The steel container is exceedingly durable. ❦ It suffers small loss of charge when idle. ❦ No frequent hydrometer readings are necessary. ❦ The tray assembly and cell connections are simple. ❦ Severe vibrations and concussions have small effect upon it. ❦ It steadily increases in capacity for the first eight or twelve months. ❦ It gives off no noxious fumes and can be placed in any environment without fear of corroding nearby steel or iron work or injuring persons in the neighborhood. ❦ It may be left standing idle in a discharged condition with absolutely no attention for long periods without permanent injury. ❦ It can be put on charge at any time, regardless of how little or how much of the previous charge has been used and similarly, it may be taken off charge at any time and used, whether fully charged or not.



Edison

STORAGE BATTERY COMPANY

ORANGE, N. J.

ADDRESS ALL COMMUNICATIONS TO THE COMPANY

THE SUNDAY CREEK COAL COMPANY

OUTLOOK BUILDING
COLUMBUS, OHIO

Edison Storage Battery Company,
Orange, N. J.

Attention: Mr. O. E. Stringfellow,
General Sales Manager.

Gentlemen:

We are using A-10 Edison Storage Batteries in connection with our Storage Battery Locomotives and have been very well pleased with the service received. In our opinion the Edison Storage Battery is the cheapest and the best battery for coal mining, for the following reasons:

1...It is practically fool proof. The Welded steel container cannot be opened by men not competent to repair storage batteries.

2...They are almost indestructible. Collisions which often happen, a fall of slate or derailment of the motor does not damage the Edison Battery. which is not true of any other make of storage battery.

Very truly yours,
THE SUNDAY CREEK COAL COMPANY
By
General Manager.

OEB:MB

The OPEN FORUM:

Practical discussions on machinery and materials used in mining will be a new and important feature of the twenty-sixth annual convention of the American Mining Congress in Milwaukee, September 24-29. All of the manufacturers who exhibit their products will be invited to send their most experienced engineers to participate in these discussions. During and after the meetings the equipment on exhibition will be visited and inspected. Nearly all the more important articles used in mining will be available for study and demonstration. To obtain in any other way the information you can secure at this exposition, would take much more of your time and money than will a trip to Milwaukee next September.

All mining men are invited to submit questions on mine equipment for discussion at these meetings. From the subjects sent in from the field, a program will be prepared and distributed in advance of the convention. The proceedings of these meetings, which will be published, will contain much valuable information, both for manufacturers and operators.

Send in questions at once for discussion.

Make your plans now to attend the Milwaukee Convention.

September 24-29, 1923

American
Mining
Congress

Munsey Building

Washington, D.C.

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FOR AUXILIARY MINE VENTILATION

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Deliver far more air than fans of any other design of the same diameter. As high speed machines with efficiencies up to 80 per cent, they require small driving units resulting in compactness and light weight, very desirable features for temporary or portable installations.

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of the

American Mining Congress

Milwaukee, Wisconsin, September 24-29, 1923

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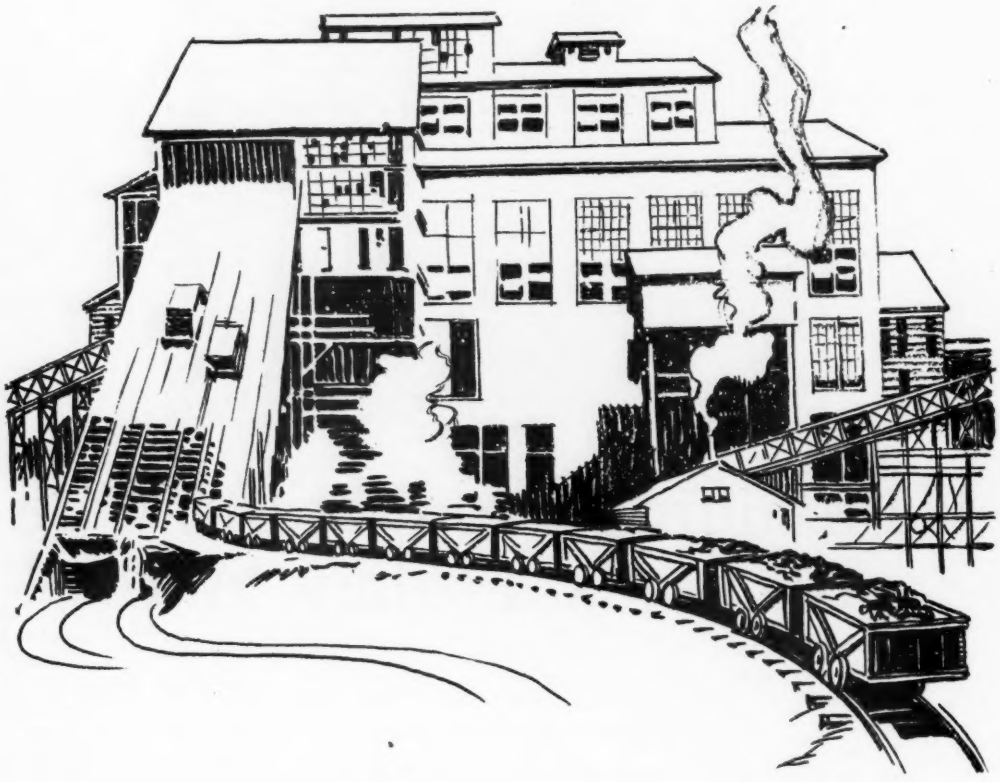

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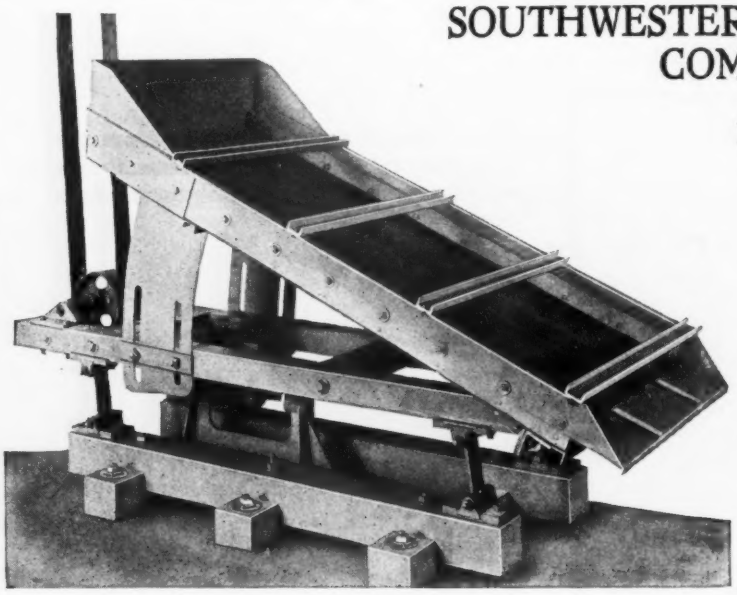

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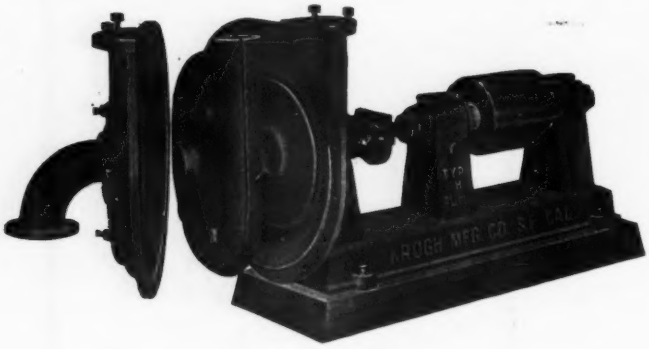

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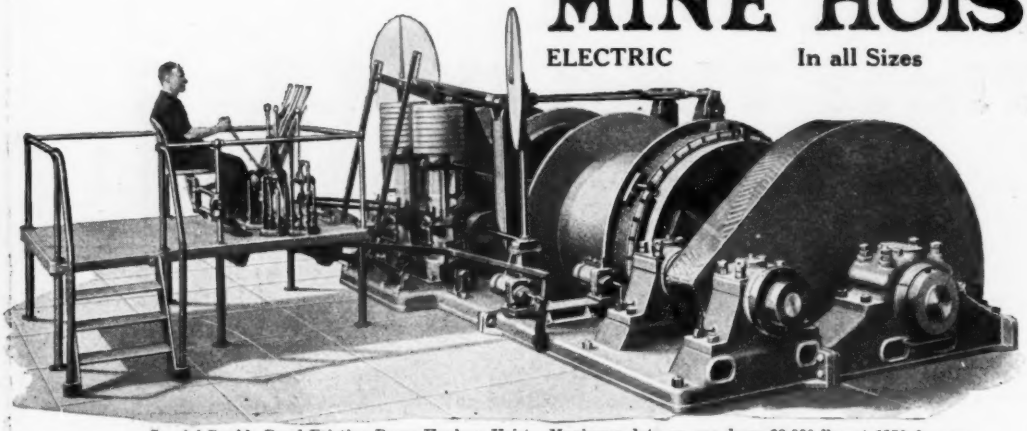

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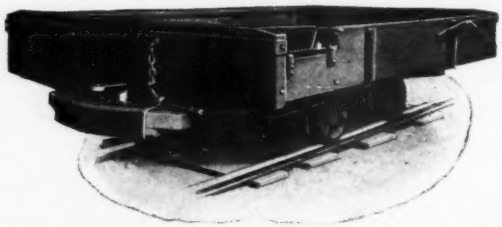

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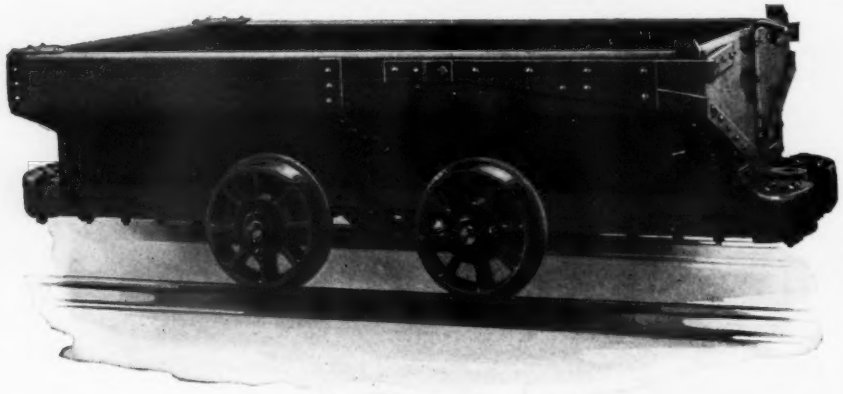

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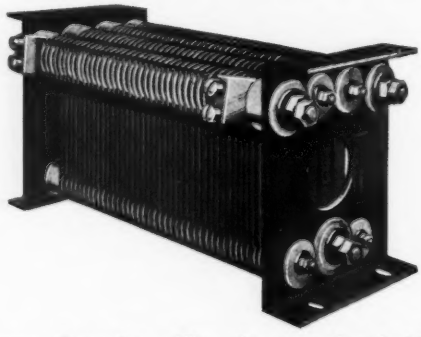

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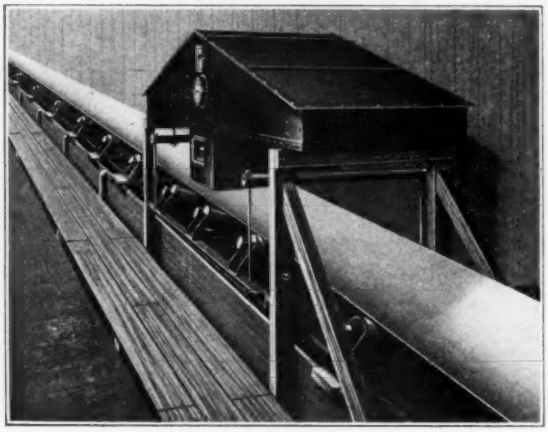

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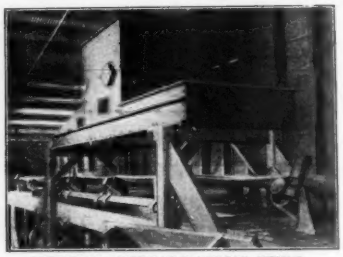

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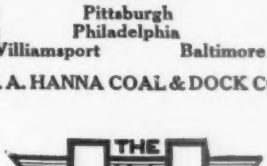

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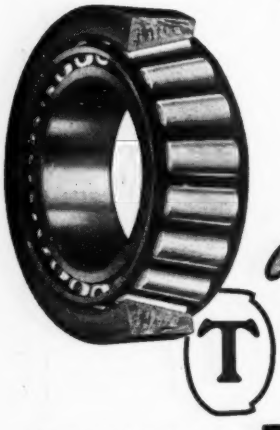

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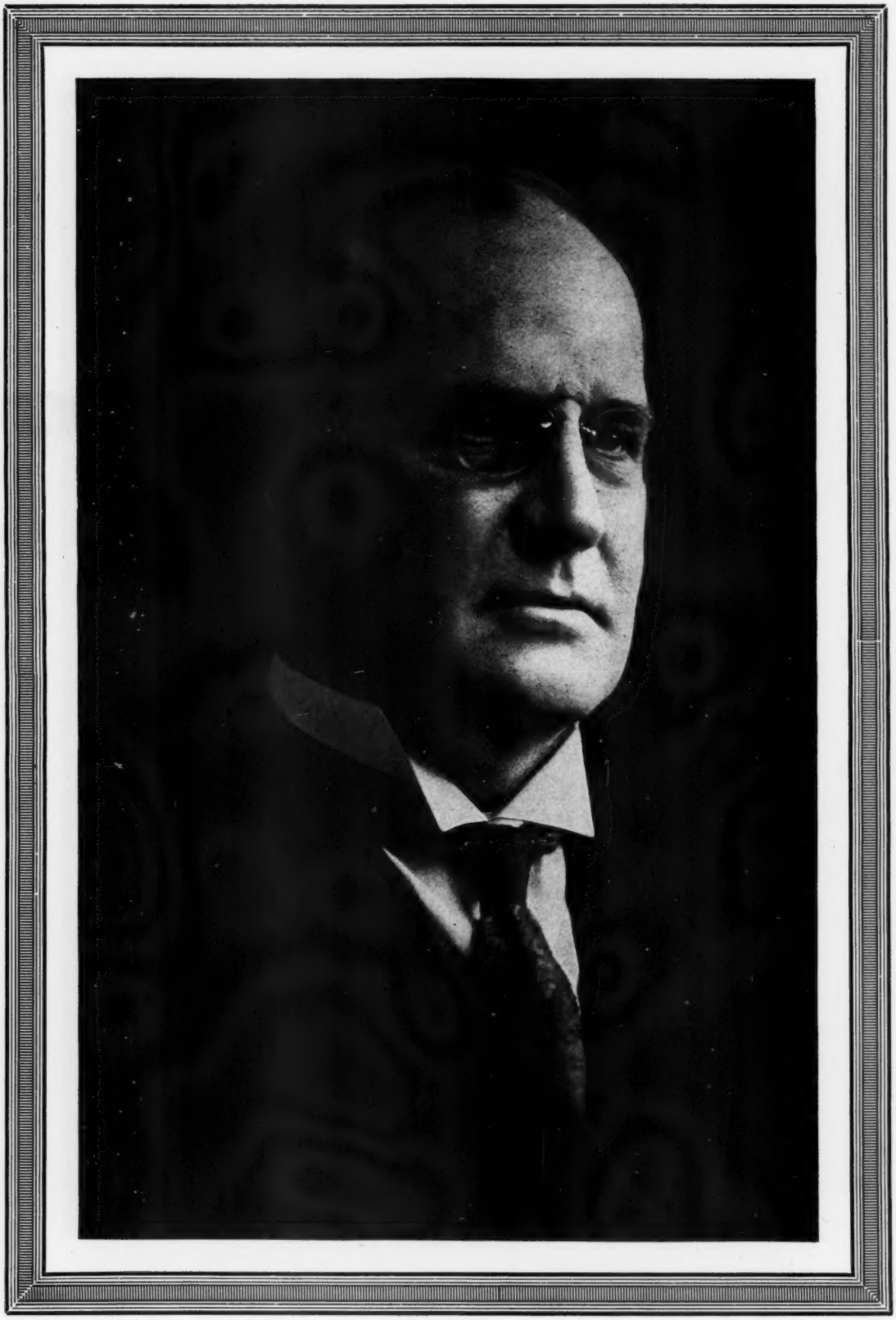

SIDNEY J. JENNINGS
President, American Mining Congress

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MISLEADING MISINFORMATION

A DISTINGUISHED purveyor of more or less doubtful facts and sensational prophecies recently gave solemn warning to the public that the automobile is ruining America. He characterizes our modern conveyance as a luxury which the public cannot afford. This imaginative gentleman is not alone. At frequent intervals others make the startling announcement that the country is on the verge of bankruptcy; that the cost of government, the luxury of good roads, the using of these roads, and the declining efficiency of our people are bringing us surely and rapidly to a collapse. They declare that our experiments in clean amusements will engulf modern civilization—that humanity cannot afford a little fun even after business hours. Obviously they look upon life as a terribly serious occupation.

Sympathizing with this thought are the many who find it difficult to pay taxes, especially after they have provided for the extensions of their business which the growth of the nation demands. However, before we become too panicky, it would seem advisable to analyze the situation and to decide what would happen if we should scrap the automobile and return to old Dobbin and the side-bar buggy.

It is true that many millions of dollars are being spent for automobiles, good roads, and the other accessories to automobile use. But where is the industry that is suffering on that account? Is there a shortage of food products anywhere? Is there a shortage of manufactured products anywhere? Our transportation service may be somewhat hampered because of conditions growing out of a, perhaps, necessary governmental control, but has anybody wanted to go anywhere and have the railroads failed to transport him comfortably, expeditiously and cheaply? Has anyone wanted to transport goods from any place to any other place and been denied the facility? What industry has suffered because of the fact that the automobile industry furnished an outlet for surplus labor and surplus capital—and an outlet for the natural love of out of doors?

Everybody who is willing to work is entitled to a living. Indeed, everyone must have a living either from his own earnings or at public expense. What, then, are we to do with the millions of men who are now employed in the automobile industry? There is no room for them on the farm; there is no room for them in trade; there is no room for them in manufacturing outside their present occupation.

The automobile is both a luxury and a necessity. It is an aid to every other line of business. The marvelous growth of the auto business is proof of its utility. And so far as the danger of ruination of our country is concerned, it may be quite possible that without this outlet for our surplus energy, there would have been stagnation or over-production in many other lines of business.

These prophets of disaster might well spend some of their time—now wasted in making such predictions—in the study of the benefits which come to the great mass of mankind in civilized countries through development of the many inventions which bring comfort and luxury to the masses of the people.

WHAT THE MINING CONGRESS MEANS

IN THIS AGE of associations—national, sectional and local—the question frequently is raised as to just what this or that association has done or is able to accomplish for an industry. This question has been directly propounded to the officials of the American Mining Congress:

"What does the American Mining Congress mean to the mining industry?"

Any "congress" is a place where a question is debated; where a decision is reached; and where an appropriate action is taken. The mining industry per se is one great entity composed of various units. The major problems of mining such as government cooperation, regulation and recognition, taxation—state and national—industrial relations both union and non-union, transportation of raw materials and finished products, are questions in common and not peculiar to any one unit of the mining industry.

Twenty-six years ago the recognition of this principle resulted in a great national effort on behalf of the whole mining industry and the formation of an organization that would do the three things desired—discuss each important question until it was thoroughly understood; reach a decision concerning it; and take appropriate action. That organization is "The American Mining Congress."

The creation of this organization did not preclude the necessity or the desirability for the organization of separate, small, compact organizations of the producers of minerals to handle state, local and sectional problems of the coal, zinc, lead, iron, copper, gold, silver and other branches of the mining industry. Therefore, in addition to the American Mining Congress, we have today many such associations.

Associations representing each branch of the mining industry and state and local associations are not only useful and desirable but are very necessary. Each phase of the mining industry undoubtedly should have a complete expression of its own peculiarities. While this is an obvious advantage, it is also recognized and becoming more forcefully apparent every day that no person, no collection of persons and no industry can go its way without recognition of the other elements that go to make up this nation. The fact that all extractive industries are essentially interallied must never be ignored; or that the fundamental principles which gov-

ern in one instance must apply equally to all others where national issues are at stake.

The American Mining Congress has attempted to correlate and bring under one organization the best thought of every branch of the mining industry as developed through its local, state and national associations. It has attempted to give the broadest possible interpretation to all problems confronting the mining industry. Representing as it does every phase of the industry, its discussions in no sense may become narrow. Its decisions must in the very nature of things be broad and the action taken by it can be taken only upon the conclusions reached by the leaders in every branch of the industry. The American Mining Congress has at all times attempted to get at the safe and sound solution of the whole relation between the people and their extractive industries and to study their problems through a common organization from a viewpoint which is fundamentally sound.

Applying this generalization of the work of the American Mining Congress to the immediate situation, we find coal very much in the public eye and perhaps at this moment one of the most discussed subjects before the nation. It is quite apparent that an important decision will have to be made about the coal industry. The coal industry is one of the most important units of the mining industry. Its influence upon industrial life is far-reaching. A decision unfavorable to the independence of coal will have a vast significance for the industry as a whole. If coal must stand strictly alone in its fight for independence, it is liable to be singled out for punishment. A decision may be reached that is dictated purely by passion or prejudice.

But, when coal stands in the public forum surrounded by its fellows in every other branch of the extractive industries and when it is then realized that a principle which is applied to one of them must govern all of them in the end, the chances are that we will get a sounder conclusion about the whole matter.

And that is the function of the American Mining Congress—to introduce the coal mining industry into the public forum, with a background of its natural allies, and thus introduce the larger question which coal raises.

This means that the American Mining Congress stands firmly for fundamental principles. That, in turn, means that no narrow decision concerning coal or any other exhaustible natural resource can be made except over the protest of the American Mining Congress. When you come to the point of it, this means that the American Mining Congress is essentially the place where the mining industry finds the sympathy and support of those who face similar dangers.

GRINDING THE TREASURY AXE

BAD investments may be avoided, according to a circular issued by the Treasury Department, if every investor, particularly small investors, will observe "twelve danger signs." The first item against which the red flag is hoisted is "mining stock." The circular alleges that "the best looking mine in the world may prove a 'white telephant.'" It suggests the idea that "a mine is a hole where fools dump their money." Needless to say, the other eleven "danger signs" are equally suggestive of the "risks" and "hazards" involved in other avenues of investment. Nothing is commended except the purchase of federal, state, county and municipal securities, which are "always safe." In making other investments, the circular suggests that investors should consult their bankers.

The Treasury Department could have advertised its Savings Certificates without taking a slap at the mining industry or any other industry. If the purposes of its advice was to advertise its securities, that purpose was most unworthy. "Small investors" have furnished the financial backing for most of the great enterprises existing in this country today, and the success of these enterprises was, at the beginning, largely speculative. Most of the wealth that has been added to the nation's resources through mining and industrial enterprises has grown from small beginnings, which were beset by risks and hazards. These beginnings unquestionably were frowned upon by bankers who were approached for financial support. Strict observance of the department's warnings would effectually stifle the nation's growth.

Admittedly, investors must be constantly on guard against fraudulent promotion schemes and against speculative ventures that are not being honestly and intelligently managed; but this should not deter any investor from staking his funds in a mining undertaking that has fair chances of success under honest and intelligent management. Without honest and intelligent management, banks fail, and even governments sink to poverty and ruin. Investors in the securities of foreign governments, and even in securities of municipalities in this country, have found that such investments are "sometimes as dangerous as mining stocks."

"Look before you leap," warns the circular. "All bonds are not safe investments. Bonds are rated according to the nature of the security behind them." How painfully the truth is borne home when the department thinks of the eleven billion dollars principal and the unpaid interest due this country on the foreign debt. Truly, it can speak from a heart that overflows with care and caution when it warns the public against "wild-cat" securities.

HANDLING MINE FIRES

IN this issue is an article by Mr. Harrington on the reversibility of mine fans and a reply by Mr. Mitke. In one aspect the question is scientific, and, to a degree, theoretical; in another it is quite practical. The theory, as ably presented by Mr. Harrington, concerns itself with what ought to be done to avoid loss of life during mine fires. Mr. Mitke projects the theory into practice, and by showing the limitations proves its faults. This discussion is decidedly worth reading, because it presents, with remarkable frankness, both sides of a great question and because both articles are by men who have strong opinions and the ability to express them.

If the debate is reduced to its essence and if the two proposals are tersely stated, we have: Mr. Harrington believes that each mine should be treated as a whole; that the fan be made reversible to the end that it may remove the products of combustion through the nearest openings, and, virtually, that sole reliance be placed upon control of the air currents.

Mr. Mitke believes that the mine should be divided into a series of small sections; that mine doors be installed between the sections, and that sections where a fire occurs should be isolated by closing the doors.

Both men recognize that a fire is extremely dangerous to all workers in a mine. That is, the fire itself is likely to injure or kill those closest to it; also the products of combustion, by traveling through the underground passages, are likely to injure or kill all others who may be

in their path. Both men stand facing the facts and are trying to devise a method of procedure which will limit the destructive effect to the fewest possible persons.

Mr. Harrington says that if the fire occurs near the upcast, the fan should not be changed, but if the fire occurs near the downcast the fan should immediately be reversed, otherwise the effect would be to needlessly endanger the great body of workers who are beyond where the fire occurs and who must be in the path taken by the smoke and deadly gas.

Mr. Mitke is not willing to admit that even a majority of fires are likely to occur conveniently close to the upcast or downcast, and hence within easy reach of the fan. He holds that a fire may occur anywhere, and must be handled where it is. His practical point is that it is extremely difficult for anyone on the surface to decide in a hurry the exact location of fire. Mr. Mitke seems willing to admit that, if we had a system of signals which automatically and instantly would locate the fire, there would be perhaps a half merit in the Harrington idea. However, in the absence of any such exact information, he says that those who are in the vicinity of the fire are in the best position to protect themselves and the others. Thus he recommends that those who are in the vicinity of a fire should be entrusted with the task of isolating it. He advises that we supply them with doors which can be closed and which, being closed, will isolate the fire.

If we understand his point of view, he does not veto the reversible fan; he admits its value. What he combats is sole reliance upon it when practice proves that in a great majority of cases it cannot save a great body of workers.

All mining questions are essentially engineering problems. The essence of engineering is to meet each situation in its own peculiar way. The real function of the engineer is to overcome each difficulty as it arises in the most effective, the quickest and the cheapest way. Mine fires are one of the great difficulties confronting the miner. Handling them is an engineering problem. Broadly speaking, no single rule can be relied upon, when equipping a mine, to avoid fires. No "one best way" exists. The method employed must be the one which fits that particular mine and that particular fire. If we understand his major contention, the foregoing is Mr. Mitke's idea. In our opinion, he seems to be entirely sound.

The discussion, unfortunately, has taken the form of a debate. Each has allowed himself to be carried off the main issue. Each, therefore, brings in too many other questions. Our opinion is that we will go further if, in the future, the discussion pays less attention to these collateral issues. That is, both writers debate whether in emergencies men may not lose their heads and do the wrong thing, etc. Those are interesting subjects, but the big issue is whether in a mine fire the mine shall be treated as a whole, as Mr. Harrington presupposes, or whether it shall be divided into sections for local treatment, as Mr. Mitke contends. The weight of logic and of practice favors Mr. Mitke's major contention.

EVADING THE ISSUE

THE leaders of the anthracite miners' organization have for a month stood firm on their refusal to allow the men to produce any coal after the first of September unless certain of their demands are conceded. This situation is not new. A year ago we had a nationwide strike because neither the anthracite nor the bituminous operators could grant these demands. Previously, we have seen many strikes on the same issues.

These recurrent difficulties and the projection of the Federal Government into the situation demand a careful analyses of the controversy. More or less intimate relations have existed between the bituminous operators and the United Mine Workers of America since 1896—twenty-seven years. By now, some things should have become fairly well known to both sides of the question and to the people. One of them is that the profits of the coal industry never are consistently large enough to allow the operators to satisfy the cumulative demand of the miners out of their own pockets. Therefore, if any wage increase is granted, and if it be compounded from year to year, it is obvious that the money must come out of the pockets of the consumers.

The inevitable deduction is that the operator, when resisting the demands of the miners, is acting as agent of the consumer.

The second known fact is that the demands of the miners have been told to the public at the time of their submission, and, if they are reasonable, the public sanctions them and pays the cost. At least, in the past, the newspapers and public men have brought pressure to bear on the operators to yield and they have yielded. However, it is obviously true that when these demands become excessive, and when the granting of them causes the prices to become prohibitive, the people being unable or unwilling to pay, show their revolt by their purchase of some other form of fuel. Ten years ago, as an example, the people of Chicago were in rebellion against the prices of certain high-grade fuels. Therefore, they undertook an intensified study of fuel engineering and rebuilt their furnaces to use a much lower grade of coal. Their experiments proved a complete success.

In the same way, the people in the East have recently begun to abandon the use of coal and have begun the use of fuel oil. In a similar mood, for the same reason and in a few extreme cases, the farmers of the Middle West have burned their corn.

The anthracite operators realize that there is a limit to what concessions they can make to the miners and still preserve their business. If, then, they resist the demands, it is not to save themselves money or to oppress the miners; their real purpose is to save the industry and to give the men the work they want to do.

After nearly thirty years of experience, both the anthracite and bituminous operators have arrived at the point where they declare that they cannot deal with the miners' union as at present organized. When the situation just described stands, and when all operators adopt an identical point of view, the people should realize that there is a fundamental fault somewhere. These operators are representative citizens of their own community. They are not lacking in public spirit. They are not wholly devoid of decency. They have, therefore, not done anything to warrant complete lack of public confidence. When, as a whole, they go before the public to say that they cannot deal, in its way, with the United Mine Workers, it is time for the people to realize that in some way that organization is gravely at fault.

One significant fact stands out. The miner himself is not expressing intensified dissatisfaction with either his wages or his working conditions; he knows that both are far above the average of American industry. Therefore, these controversies involve no single question of fair dealing with the men themselves. What is at the bottom of the whole controversy is that officials of the union demand that the present management of the anthracite mines shall abdicate and allow them to run the business. In a word—the officers of the miners' union

demand they shall be allowed to dominate the industry. In our opinion, industrial peace in the coal field is out of question until that issue is met.

The miners' union has been kind enough to affirm and to clarify the issue thus exposed. They have notified the coal operators that it is the inalienable right of the miners' union to say who may and who may not work in the coal mines. When, in 1918, the State of Illinois discussed the possibility of taking over the mines during a strike, and when, in 1922, the governor of Michigan proposed the same action, the miners' union declared that in so doing the state would but become the employer, and, as such, would itself have to deal with the union. Recently, when the U. S. Coal Commission proposed that the President take over the anthracite mines of Pennsylvania, the miners' union declared that the Federal Government would then become the employer and would have to deal with the union. That is, the officials of the miners' union have refused to work for any employer—the government not excepted—until their demands are granted.

This means that the union proposes to confiscate the property of the operator. That is the real issue and must be faced and settled. Any attempt at a settlement which leaves this issue alive is clearly an act of evasion—no matter who is responsible for it.

THE TAMING OF THE SHREW

NO one is a prophet. No one can, therefore, plan far into the future and make good on it. Still, we try and leave wrecks behind.

Before the advent of the railways, men made their plans for future business success based upon warehouses, canal boats, river traffic, ships, wagon haulage, etc. Then the railroads came and compelled the revision of each plan.

After the people for three generations had pinned their faith to steam railroads and had come to translate all business transactions into terms of steam railroads, we got electricity and also governmental regulation of the carriers. As the result of these two things—which led in opposite directions, incidentally—we are again in the throes of transitions. And, lacking patience to allow time to bring its own developments, we are trying, by artifice, to adjust all of these things to each other so that they will make up a transportation unit. That is, in the pride of our own mental capacity, we hope to tie into a common chain everything from the ox cart to the airplane. And we are a little impatient with managers of our transportation lines because they do not come forward instantly with a "constructive program."

Everyone knows that our whole economic structure was torn down and built over by the introduction of electricity, by the manufacture of soft steel, by the treating of complex ores, by the introduction of certain chemicals, the electric light, the telegraph and wireless, the automobile, etc.

However, while our whole economic structure is thus constantly in a state of flux, there is in certain quarters, great impatience for a "constructive program" touching every phase of our economic life.

The very conception of such a program is an absurdity. All economic activity is like a chemical reaction in that the character of the reaction must depend upon the elements which comprise the mixture. Any economic reaction must, likewise, be the direct and logical resultant of the operation of the elements which make up the situation at any particular minute. If those elements are changing, the economic reaction must change with them. Therefore, unless we can predetermine in detail what the elements are to be, we cannot predetermine the result.

Thus, the eternal search for a "constructive program" for this or that industry is reaching out into vastness for that which is not only unattainable but for that which is undesirable. That is, if we should attain it, we would stop growth and progress. Any program based upon the elements which are now available would, if carried out, forbid the introduction of any new elements. And to forbid the introduction of new elements is to stop the play of competition and to freeze processes in the present stages of economic imperfection.

Every practical business man in America understands the truth and the logic of this statement. And yet, in every industry, there is a nervous reaching out for a so-called "constructive program." When industry is thus going contrary to the better judgment of its practical men, there must be an impelling force somewhere outside of industry.

In every industry today it is customary to hear some such statement as:

"What you need is a 'constructive program.' What your industry needs is to police itself. And you gentlemen may as well realize that if you do not do these things for yourselves *they will be done for you by governmental agency.*"

The Congress of the United States thus is presented to American business—whether rightly or wrongly—as being in a mood to demand of business an impossible and undesirable program. The penalty of failure or refusal to supply it is to be confiscation of that property by government.

When Mr. Charles Evans Hughes made a plea before the United States Supreme Court against the Lever law—the price-control statute—he said that business was being subjected to a "reign of terrorism." That, in fact, is about the present situation. The men in business are being urged to do a thing which cannot be done. The penalty for failure or refusal to do it is a threat that Congress will take over and regulate industry and cause a commission to assume its management.

Our own belief is that those who thus threaten business men with Congress are grossly misrepresenting—if not indeed libeling—our legislative body. We fail to believe that Congress is in a mood to indulge in wholesale confiscation of private property, or is in any mood to try to compel business to adopt any unwise measures.

However, Congress should take into account the fact that business is being told these things. It should realize that business men are acting unwisely under the impulse of this great fear.

In our opinion, the situation would be vastly relieved if Congress, exercising its right to protect its own good name, should call to account those—in the government service and elsewhere—who are threatening business in its name with confiscation of their goods and property.

SOME UNWHOLESOME DOCTRINE

WASHINGTON, in these days of government in everything, is America's greatest market for certain kinds of ideas. Everyone having that kind of idea to sell, comes here to sell it. And he tries to sell his idea to the public as a means of forcing it upon official Washington.

Washington is not, therefore, responsible for the kinds or varieties of ideas which are distributed or which emanate from within its confines any more than the metal garbage can is responsible for the odor of its contents.

If it were responsible, even in part, for some of the ideas which are cast about indiscriminately by many of its temporary residents, the nation's capital would be an unpopular place. But, since Washington is not responsible for its thought-distributing agencies, it continues to occupy a favored place in the hearts of all true Americans.

Patriotic sentiments are being sown constantly by those officials and agencies of the government, and those patriotic organizations, whose regard for the Constitution and the Republic's sacred institutions governs their motives and conduct. But the seeds of radicalism, of government paternalism, and of political discord continue to flow freely from the mouths, pens and reservoirs from which emanate much of the misleading propaganda concerning vital public questions.

No member of Congress, no government official, and no governmental agency should be a distributor of ideas that tend to poison the public mind, turn the thoughts of the people into destructive channels, lessen the sacredness of the Constitution, weaken the people's respect for law and the courts, or destroy the love and loyalty that good citizens should have for their country. Immediate cessation of the free distribution of such ideas is a paramount necessity to the welfare of the nation, its people, its industries, and its institutions.

AN UNTENABLE POSITION

THE CONTINUITY of a government depends upon the supremacy of its authority. No government can permit the existence of an organization within itself with powers superior to its own. No government can consent to a method of raising revenue for an organization of citizens which is superior to its own power of taxation. There is no lien against real property which is more fundamental than a lien for taxation. There is no obligation against any individual which is more basic than his obligation for personal taxes. Yet the government cannot force a deduction from wages or salary due to an individual from his employer for the purpose of collecting taxes. Such a thing would be an invasion of private right which the citizenry would never allow. The government cannot, therefore, consent to this method of deduction from the wages of the individual for the support of an organization within itself.

The check-off, which the mine workers have demanded, would do exactly that thing. The check-off is an agreement whereby deductions are made from the wages of every man employed in a mine for the purpose of paying to the union dues and assessments. The negotiations by which the mine workers seek to establish the check-off would constitute an assignment of wages for the payment of future obligations. These obligations would be created by the accruing of such dues and assessments as the union may levy during the period of employment of the wage earners. The pay envelope of every wage earner thus employed would be subject to the arbitrary demands of the union.

The check-off would be an agreement between two parties concerning the wages of a third party and arrived at prior to his employment and who is not himself necessarily a party to the agreement. The illegality of such an invasion of private right and such supersedence of governmental authority is self evident. In asking the government to lend itself to the establishment of the check-off, the mine workers have asked its assistance in superseding the authority of the government itself and that the government lend itself to this invasion of private right.

A SILVER POLICY

THE future market for silver is dependent on just two things—the same two things that all markets are dependent upon, demand and supply. As the market is lower today than it has been since 1918, it is apparent that the supply exceeds the demand.

There is no question which is so bound up in world economics as is silver. Like gold, a basis for currency, but unlike gold, which is itself a standard of value, silver is both a commodity and a form of exchange for other commodities. The British have recognized this fact for many years. They have dominated the silver currencies of the world by their understanding of world economics, not because they have been large producers of silver. The British have gone into the trade of the Far East with silver; they have paid this silver for rice, tea and other basic transportable commodities. It is with extreme diffidence that we would suggest any plan for "solving the silver situation." We know that any plan anyone might suggest would be pronounced faulty by at least twenty well-informed persons. And we know at least twenty plans which we would pronounce faulty.

It is reasonably beyond dispute, however, to say that to increase the use of silver in world commerce it must be exchanged for goods, not gold.

If the producers of silver of the United States are going to sit in on the silver game they will have to seriously consider going into commerce. Extension of the use of silver in the arts is dependent upon advance in science; extension of the use of silver in the currencies of the world is dependent upon the injection of silver into the system of commerce. To say to a nation whose currency is demonetized, a nation, for example, like Germany or the nations of Central Europe, "you need silver in your subsidiary coinage. The money which daily passes from hand to hand should be of this basis standard value," and the reply will be, "And with what shall we buy the silver? Surely not with gold. We must buy it with goods." Any consideration of the silver problem which gets to the bottom of the present situation must place more emphasis on increasing the demand for silver in the commerce of the world than it does upon increasing the supply through increasing the facilities for production.

This will best be accomplished by a closer relation to that part of the world commerce which can absorb silver.

THIS MUCH IS TRUE

NOTHING is more vital to a nation than the source of its own revenue. A nation may go further to get money for its own maintenance than it can in the pursuit of anything else because without money the government must perish.

One look at the tax question discloses this vital fact. The states have reserved to themselves all taxes on property. The national government must look elsewhere for its money. And, to make sure that the property may be free to pay its tax and sufficiently prosperous to yield the revenue which they need, the states have said that they, only, will regulate property. They know that if any outside forces should regulate property, those forces might so wreck it that it could not not meet the state's tax assessments.

If the federal government cannot tax property and if states to protect their own incomes, alone can regulate property, why all this talk of federal regulation of this or that industry? The whole idea is absurd—that federal regulatory power may travel further than its taxing power.

THE GROUNDWORK OF DISCUSSION AT MILWAUKEE

The Essential Facts About Industrial Relations and Taxation—What Our Method of Making Wage Agreements Leads to—Where the Government's Money Comes From and Goes To.

MEMBERS of The American Mining Congress will assemble in annual convention in the Public Auditorium at Milwaukee, Wisconsin, on September 24 and will continue in session until September 29. Various subjects are listed for discussion.

The American Mining Congress never has been and is not now a place where men assemble for the mere purpose of exchanging information. On the contrary, the sole purpose of discussion has been and is to reach conclusions which are expressed in resolutions. The latter become the instructions of the members to their officers and employes as to what should be done. The purpose of the discussions, therefore, is not to exchange information but to say those things which will lead logically to a conclusion and to appropriate action.

It is obvious from the program that the outstanding questions are:

1—What direction can be given to the relations between labor and capital which will avoid friction and public distress?

2—What may be done to allow the railroads to give service to passengers and shippers without unduly burdening the people and without crippling the carriers?

3—What should be the public attitude toward the coal industry, due consideration being given to the fundamental principles involved?

4—What principles of taxation should be employed to give the government the money which it must have and still leave the taxed industries in a sound economic position?

5—What, further, may be done to advance the cause of standardization?

The purpose of this article is to lay before the members of the American Mining Congress the essential information upon each of these subjects to the end that the discussions may be shortened and may be devoted less to exposition and more to arriving at conclusions. Three of the five subjects—transportation, standardization and coal—are treated somewhat in detail in separate articles in this issue. The essential facts on the other two are here set down.

Industrial Relations

It is quite obvious that industrial relations everywhere are sadly in need of repair. In every industry the employers and the employes are at loggerheads. The worker takes one position; the employer takes another. Each disputant has built a powerful organization to propound its theory.

On the labor side, the strength of each individual trade union has been augmented by its affiliations with other craft organizations. These relations have long since been welded into a federation. Within this federation, various groups have begun to form alliances for offensive and defensive purposes.

This work of building labor toward unit expression and action is forcing employers everywhere to consider the advisability of taking those actions and of creating those federations of employers which will develop a strength of capital equal to that of its opposition.

FIGHT ON INJUNCTIONS

In the intensive struggle which differences of opinion among these large aggregations beget, theories come quickly to a focus; they develop into issues which involve fundamental principles of public and private action

For example, a local union in one trade association wishes to carry to success a skirmish with its employers. It is on the point of defeat when it resorts to acts of violence which induce the court to issue an injunction against it. The local, thwarted in its determination to do something unlawful, turns about to cry down the law under which the injunction was issued.

An accumulation of these local complaints has so impressed the American Federation of Labor that its president has advised workers everywhere to fight any and all injunctions.

Thus the passions of labor have carried it so far it now demands that the property which gives it employment shall be stripped of that protection which the law affords during those times when it is out of patience with its employer and is in a mood to destroy the means by which it makes a living.

DOMINATION IS DEMANDED

The present form of negotiations has engendered so much passion that the outstanding craft union—the United Mine Workers of America—has come to demand:

1—Complete control of the coal industry;

2—The nationalization of all coal property;

3—The surrender to its members of the full selling price of the coal less only the freight rates.

It seems to recognize that the final granting of these demands must be delayed. In the interim, it demands the right to restrict production per man per day and the right to collect wages which show an increase over the peak wages paid during the war.

It is true that, as yet, these extreme demands have been made in only this one industry. But when the quarrel of the local unions with the local judge over the issuance of injunctions leads quickly to the demand for the destruction of the whole injunctive process, it is not too much to believe that when one national union shall demand those larger concessions, they shall soon become the program of the Federation.

EMPLOYER SEEKS SAFETY

When an individual employer—but loosely bound with others into an organization—is confronted by the massed strength of interlocking groups of workers, he appreciates, soon, that resistance is futile. When he has arrived at that point, he—if he is humanly selfish—decides to try to turn an almost hopeless situation to his profit. Accordingly, he adds together the cost of his labor and of his supplies, and, after adding thereto a percent of profit, tries to pass the resultant price on to the consumer.

However, that method of procedure has its definite limitations. For example, the producers of anthracite have, within ten years, doubled the wage rate, and, by making concessions on working conditions, have trebled the labor cost of production. In addition, the operators paid the customary increase in the cost of supplies. The sum of these items was

the cost of the coal. The producers, to get their profit, added their margin to the cost. Thus—and soon—the price of anthracite in the open market was more than double its pre-war level.

At any such a price the coal produced in other countries could flow into the anthracite markets. When that happens, the whole artificial structure must tumble about the heads of those who built it. The result is that anthracite is fast approaching the point where importations of coal are invited and where the users at home are beginning to study and to seek substitutes.

It is thus obvious that the demands of labor are becoming unreasonable. Such demands must destroy the industries which employ the workers. It is also obvious that these methods cannot continue indefinitely if the economic position of the country is to remain sound.

METHODS OF NEGOTIATION

When we begin to analyze the subject to find the cause of this curious development, we are forced to pay particular attention to the present method of negotiating wage scales. The essence of the method is the phrase "collective bargaining." To the word "bargain" union labor has given the harsh and somewhat sinister meaning for which the Yankees are supposed to stand sponsor. To their minds, it usually means a merciless transaction in which each gets the most for himself and thereafter consigns the other to the care of the devil. When this harsh phrasing is applied to the relations between a group of employers and employes, it means simply that they start toward peace with the most bitter possible disputation.

And it means, too, that if they shall fail of an amicable settlement, the unionists shall resort to the coercive force of a strike. Collective bargaining, to their way of thinking, presupposes the employment of the strike if an agreement shall not be reached through violent disputation.

The all-important fact is that these disputes have become so violent and the organizations which engage in them have become so large that the resulting strikes have become terribly dangerous to the whole people.

INDUSTRIAL COOPERATION

At this intense moment in the affairs of American industry, the members of the American Mining Congress assemble to discuss what new method of procedure shall be substituted for that which is proving both dangerous and disastrous. It has created a Division of Industrial Cooperation. It has appointed committees to have charge of various subdivisions of the broad inquiry into the whole subject. It is preparing to staff those committees. But, before going further, there must first be a decision by the mining industry as to the direction which these important activities shall take.

At this point, the presentation of the situation ends. The members of the American Mining Congress, on the floor, must carry the discussion through to some sort of a conclusion.

Federal Taxation

The question of federal taxation presents, in a way, another aspect of the industrial dispute; it concerns vitally every individual; more is said about it than perhaps about any other subject; and, about it, apparently, very little in serviceable detail is known.

The admissions with which the discussion must start are:

1—The Federal Government has certain activities which must be carried on and which cost a stipulated amount of money. This money must be raised by taxation levied against the citizens. Each must pay his just share of the proper cost of government.

2—The Federal Government has today two expenses to meet, namely, the inevitable extension of those activities and expenses which were here before the World War and the expenses which are the outgrowth of the war.

The debatable question is as to what constitutes the proper activities of the Government and therefore what is the proper cost of government. A collateral question, open for debate, is: What is the proper direction in which the Federal Government must look for its money?

COST OF GOVERNMENT

Roughly speaking, the cost of government before the World War was about one billion dollars per year. Equally roughly stated, the present cost of government is about three and a half billion dollars per year. It seems to be somewhere in the neighborhood of the truth, therefore, that the after effects of the World War are now costing us between two and two and a half billion dollars per year.

A similar survey of the source of revenue yields the conclusion that, before the World War, the Federal Government drew its revenues from import duties and licenses. It is now drawing part of its revenues from those same sources, but it is augmenting them by taxes on personal and corporate incomes and to an extent by sales taxes. During the war, it drew part of its revenues from taxes assessed against excess profits. It is proposed that this tax be renewed next year.

It seems true that, even before the war, the revenues derived from duties and licenses were not sufficient. Therefore, the revenue organization was already casting about for new sources of federal income. It was, even then, declared to be inevitable that the government would fall back upon the earning power of individuals.

Since the war, the income from licenses has been reduced by prohibition which wiped out the tax on liquors. This has been offset, in part, by the revenue from tobacco and especially from cigarettes. However, the cost of enforcing the prohibition amendment has been so enormous that the benefits of the tobacco tax are, so far as the general government is concerned, greatly modified.

The Federal Government, in its search for money, is struggling, constantly, against the fact that whereas normally its revenues come largely from imports, the merchants and manufacturers are demanding higher duties on many things. The duties tend to restrict imports and to lessen the federal income.

Also, the business people resist the levying of a tax upon their personal incomes and upon the profits of their enterprise. However, the government must have this money.

TAX BURDEN OF BUSINESS

The states have reserved to themselves the right to tax property. The local taxes—city, county and state—were so heavy in the past that they wiped out the total value of each piece of property each thirty years. That is, the individual who owned property had, by paying taxes, to repurchase it from the local government, on the installment plan, each thirty years.

The Federal Government exempts from tax that part of the individual's income which arises from the interest on bonds which, in the states where they were issued, are tax exempt. This fact has caused many of the larger incomes to be translated into tax-exempt securities. This, in turn, has made a ready sale for city, county and state bonds. And this in turn has encouraged extravagance on the part of local governments. To meet their interest charges on these larger bond issues, the local governments have had to increase the taxes on the property.

As a result of this complex system, the man who is engaged in business has had to pay:

1—An increasing tax on his property;

2—An increasing tax on the going business done on that property; and,

3—An increasing tax on that part of

his general revenue which he devotes to his personal use.

The measure of the tax burden is roughly shown by one sweeping generalization, which may or may not be accurate, but which is believed, nevertheless. It is said that the annual increase in wealth—the annual addition to the value of taxable property—is about ten billion dollars. It is known that the cost of the Federal Government alone is three and one-half billion dollars. If both figures are accepted as correct, then it is obvious that the annual cost of the Federal Government is 35 percent of the annual increase in wealth of the nation.

It is declared by those who have investigated the question that the cost of the city, county and state governments is equally as large as that of the Federal Government, if not larger.

Thus, it becomes apparent that the sum of the national and local tax burden is about 70 percent of the annual increase in wealth of the nation. If the investment in tax-free securities is added, almost the total increase in wealth is being eaten up by the cost of government. This is making it extremely difficult for the business enterprises of the nation to obtain the additional capital with which to finance the new undertakings. This restricts the nation's ability to expand its commerce and hence to produce more property to share the growing tax burden.

GOVERNMENT REGULATION

When, in the face of the foregoing facts, the government proposes to extend its activities and hence to increase its expense by creating new agencies to regulate business enterprise, the business people naturally find themselves in rebellion against the proposal.

At this point, the businesses of the country find themselves facing precisely the same impasse that they do with respect to the demands of labor. They cannot pay these taxes without increasing their prices. They cannot increase their prices without surrendering their markets to foreign competitors or without driving their customers to the use of substitutes.

Wise leaders, like Mr. Harding, have been preaching and practicing the most rigid public economy. In one of his most important speeches, delivered just before his death, President Harding made a strong plea for governmental economy, both state and federal, and for a limiting of governmental activities to that modest income of government which would not hamper the people in their commerce.

LEADING TAX QUESTIONS

With this much of an exposition of the tax question in the back ground, it would seem that the discussion at the Milwaukee convention, if it is to be purposeful, should devote itself to:

1—Disclosing the safest methods of taxation which may be relied upon to raise the revenue which the Federal Government needs.

2—Disclosing the best methods which, when employed, will tend to restrict the activities of the government to those things which are essential to the preservation of order and to the enforcement of laws.

THE VITAL ISSUE IN THE COAL INDUSTRY

By John C. Brydon
President of the National Coal Association

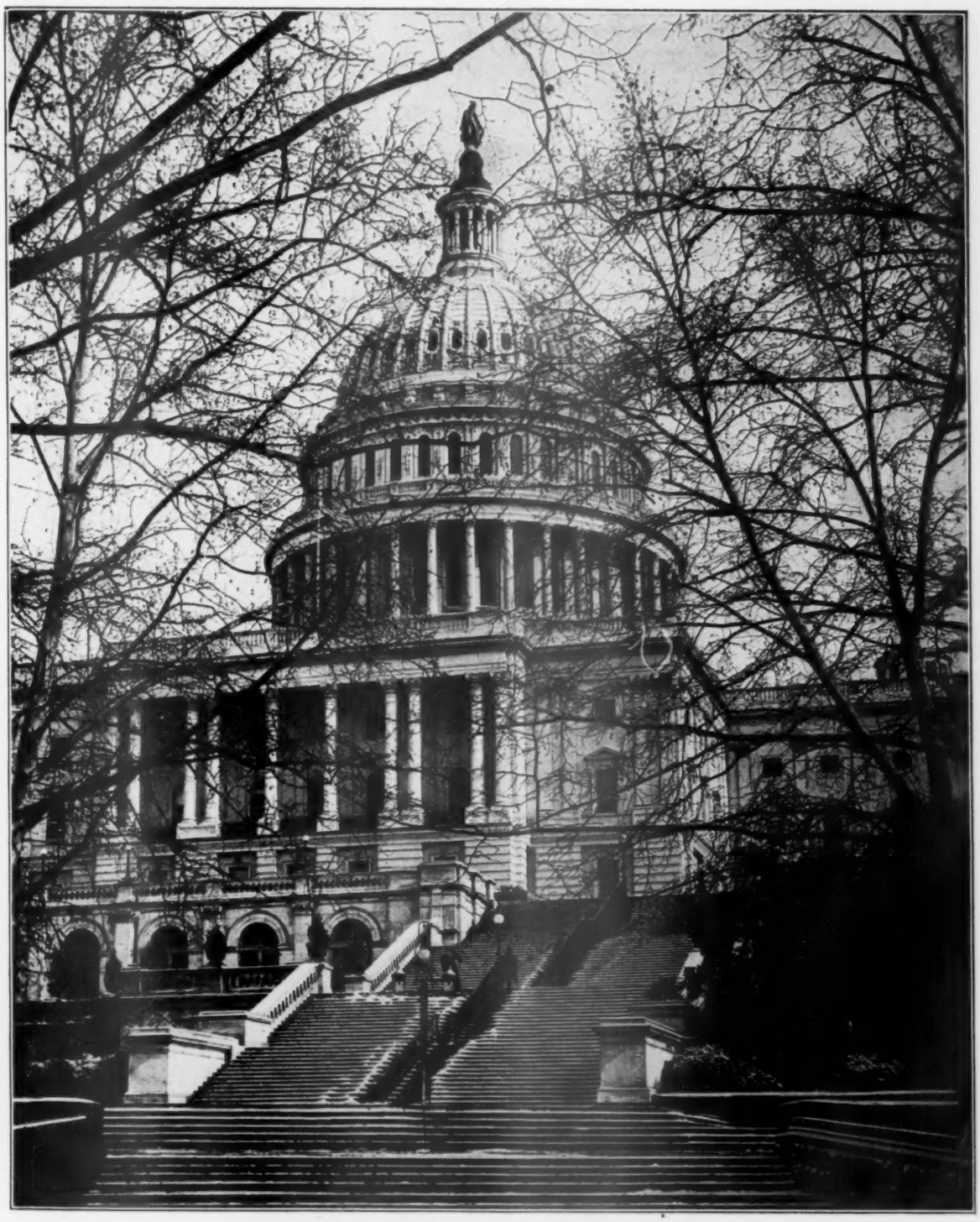
THE present situation in the coal industry raises a clear-cut issue which vitally affects the public interest. In the union fields there is a combination of all the miners, in some cases protected by state laws which effectively prevent their labor from being replaced if they cease work. In this situation all individual action of miners in competing for jobs, all individual action on the part of companies competing for workers, is wiped out. There is a divided group of operators, brought together into a semblance of unity only by a common emergency, faced with an artificial combination of labor which has the power to close down a basic industry, and so to deprive the public of a commodity for which there is a continuing and urgent demand. This situation arises as a result of the existence of what in fact is an artificial personality and power to combine, which completely restrains the normal activities of natural persons. Without the existence of this artificial person, any such thing as a complete shutdown is unthinkable.

Labor claims the right of combining on the plea that the power to be attained through combined action is necessary for its protection and for the promotion of its interests. The public has acceded to that plea. But the issue now, not merely in the coal industry, but throughout the organized industries of the country, is this: Does or does not the power to form artificial combinations which the public has permitted to be created and set up carry with it certain limitations as the very conditions of its existence? It is well enough for an individual worker to say, I will work, or not, as I please. It is well enough for an individual operator to say, I will employ or not, as I please, and work my mine or not as I please. The public is not seriously affected. But when an artificial combination has been set up which has the power to say, "This industry, and every man in it, cannot work unless my demands are granted," a very different situation exists and one in which the public has a vital concern.

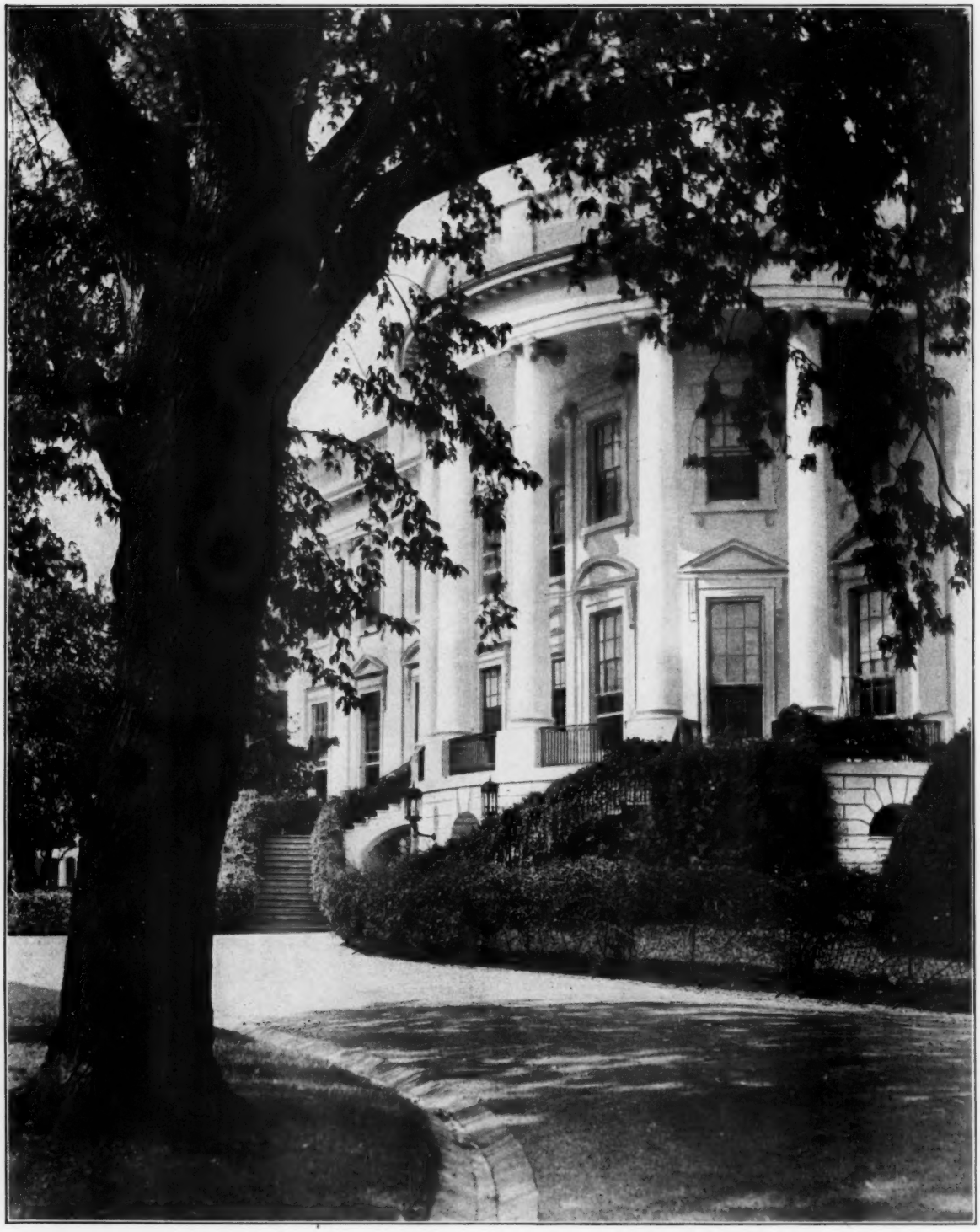
John C. Brydon

It is only a *combination* that has power to make such a demand. If the public interest is to be preserved, such power should only be allowed to exist on condition that that combination is willing to submit its demands to impartial arbitrament. The public should insist that as a condition of existence such artificial combinations, with their great power, should not use the economic bludgeon of the strike or lock-out, the heaviest blows of which fall on the head of the public, and that part of the public which is weakest and least able to sustain it. Substantially as evil as the use of the bludgeon is the threat of its use being made by such a combination. The use of that threat raises a moral issue which should not be ignored.

(*Concluded on page* 336)



The majestic symbol of the great principles that have welded together one hundred and ten millions of people, proving to a skeptical world that government of by and for the people shall not perish



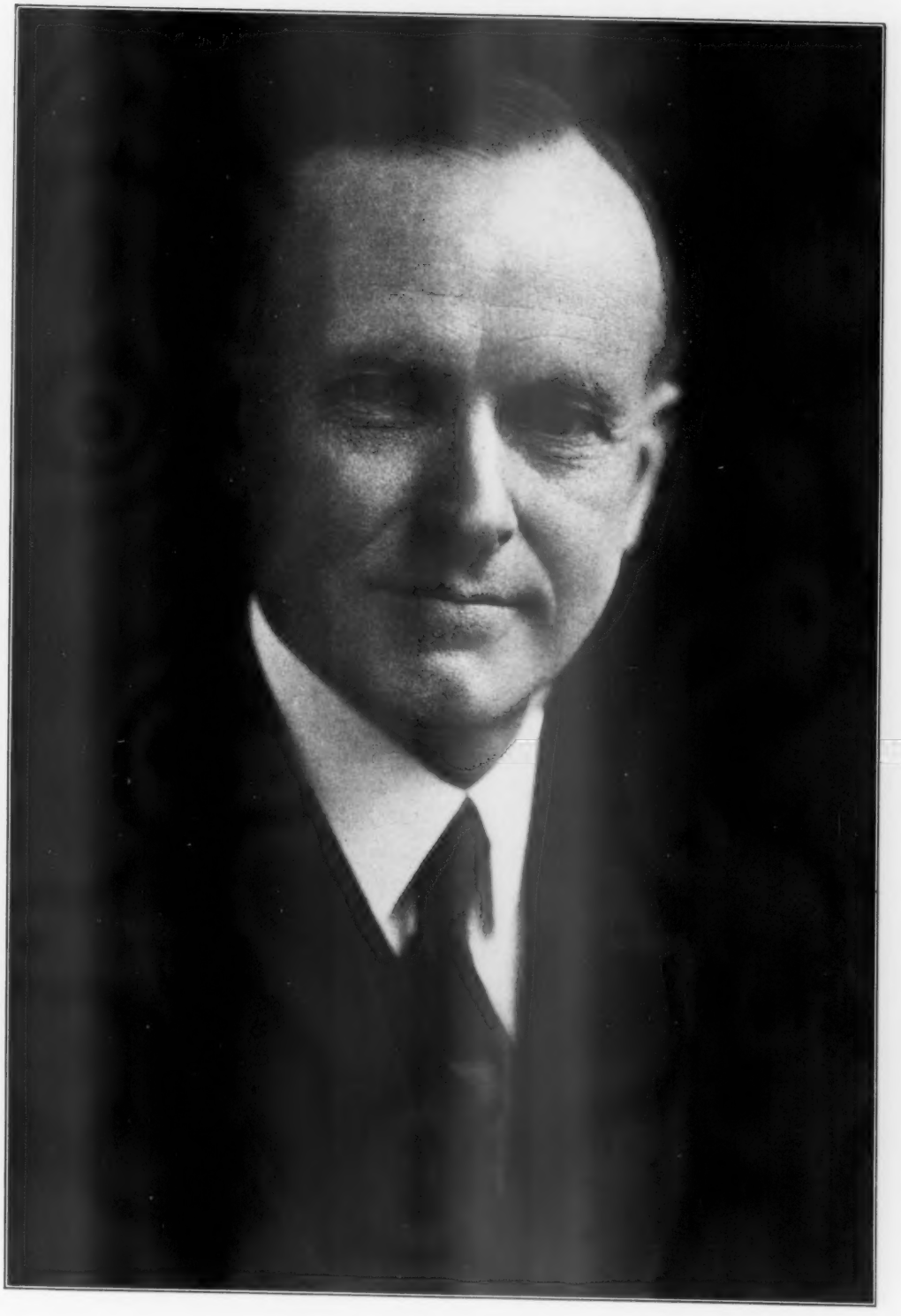
Friendly Simplicity—the true embodiment of greatness. The White House. For one hundred twenty three years the home of the chosen leaders of the American people

Warren Gamaliel Harding

Born November 2, 1865
Died August 2, 1923

The twenty-ninth President of the United States. In life he was devoted to his duty and gave his life to fulfill his conception of the demands made by the high office to which he was chosen.

To the American Mining Congress
With my cordial greetings and good wishes to both
officers and members. Warren G. Harding



Calvin Coolidge

Born July 4, 1872

The Thirtieth President of the United States. He came to the Presidency through the death of Mr. Harding. The sixth vice president to succeed to the vacant office. He comes to his office with a great natural courage, a high regard for the Constitution and our body of laws and an absorbing devotion to his public duty.

Under One Roof: The U. S. Bureau of Mines; The Geological Survey; Land Office; Coal Commission; Internal Revenue Bureau and Customs

THE DEPARTMENT OF THE INTERIOR

The Conference Room at the Headquarters of The American Mining Congress is available at all times to Members

E. K. Swigart

Dr. T. C. Phillips

Bruno V. Nordberg

MILWAUKEE, FAMOUS FOR ITS MANUFACTURING AND HOSPITALITY

THE CITY of Milwaukee with its population of about 500,000, with its great manufacturing industries, furnishing mine equipment machinery to all parts of the world and with its beautiful location on the shores of Lake Michigan, furnishes an almost ideal meeting place for the 26th annual convention of the American Mining Congress.

Milwaukee is the largest machinery manufacturing city in the United States. It is the natural rendezvous for buyers of mine equipment both from the iron ore and copper districts in the north, from the great metal mining centers in the west and for the important coal-producing areas in Illinois, Indiana, West Virginia, Kentucky and other points. Wherever man mines, digs, builds, manufactures, transports, or carries on all the varying activities of modern civilization, we find Milwaukee built machinery and the delegates at Milwaukee will have the advantage of being able to study the representative displays at the Exposition of Mines and Mine Equipment and of visiting some of the largest and most important mine equipment manufacturing plants in the world.

In addition to its importance as a great manufacturing center, Milwaukee is one of the most beautiful cities in the United States. Its delightful residential districts along the lake shore are famous and in no city in this country is there a greater degree of civic spirit or community cooperation.

The best evidence of this spirit of hospitality and friendship is indicated by the fame which Milwaukee has obtained for the effective handling of large con-

Neil C. Lamont

THE GIST OF IT

UNDER one roof, in Milwaukee, at the convention of the American Mining Congress, the last week of this month, will be staged a discussion of:

1—How may industrial peace be brought to mining?

2—How may taxes be reduced and still supply the government the money needed for legitimate work?

3—How may transportation service be improved while leaving the carriers solvent and the shippers unharmed?

4—How may the machinery of mining be standardized?

5—What may be done to solve the coal problem without danger that paternalism will spread?

America's best minds will discuss these questions. They will take part in framing the answers. The convention of the American Mining Congress promises to write a new chapter in mining history.

M. W. Babb

Frank C. Cleveland

ventions. In no city in the United States do the citizens of the community cooperate more generously or more effectively in welcoming out-of-town visitors and in doing everything in their power to make the stay of the visitors in Milwaukee delightful from every aspect.

The American Mining Congress is particularly fortunate in holding its convention in Milwaukee in late September. For this is usually the most beautiful and delightful season of the entire year. The heat of summer days has passed and the mellow warmth of Indian summer is just beginning. No other city in this country can furnish more attractive advantages than Milwaukee at this season of the year for Milwaukee is surrounded by a number of picturesque resorts and from every standpoint—as a recreation center—Milwaukee is almost unequalled.

Representative Milwaukee citizens and the leaders of its business interests are taking a great interest in the meeting of the American Mining Congress and through the various Milwaukee committees, have been cooperating in every possible way to make this convention an outstanding success. Among the gentlemen who have been of great assistance in carrying out the plans for the convention are Max W. Babb, vice-president of the Allis-Chalmers Mfg. Co., who is chairman of the Milwaukee Executive Committee; Bruno V. Nordberg, jr., executive engineer of the Nordberg Mfg. Co., who has acted as chairman of the Finance Committee; J. J. McDevitt of S. Obermayer Co., who has taken the responsibility of providing the entertainment for the delegates; E. A. Wurster of the Falk Company, who has served efficiently as chairman of the Exposition Committee.

MILWAUKEE EXECUTIVE COMMITTEE

M. W. Babb, vice-president, Allis-Chalmers Mfg. Co., West Allis, Wis., chairman.

Bruno V. Nordberg, jr., Nordberg Mfg. Co., vice-chairman.

E. K. Swigart, vice-president, Bucyrus Co., South Milwaukee, Wis.

Neil C. Lamont, general manager, Worthington Pump & Machinery Corpn., Cudahy, Wis.

Dr. Thomas C. Phillips, Milwaukee, Wis.

W. J. Fairburn, secretary of the Milwaukee Metal Trades Ass'n., Milwaukee.

Frank C. Cleveland, Exposition Bureau, Milwaukee Association of Commerce, secretary.

ENTERTAINMENT COMMITTEE

J. J. McDevitt, S. Obermayer Co., Milwaukee, Wis., chairman.

A. K. Birch, Allis-Chalmers Mfg. Co., West Allis, Wis.

H. R. Brandt, advertising manager, Chain Belt Company, Milwaukee, Wis.

Philip J. Glas, Jones & Laughlin Steel Corpn., Milwaukee, Wis.

Frank L. Fawcett, 14 Wells Street, Milwaukee, Wis.

Ray A. Crain, advertising manager, Athletic Club Magazine, Milwaukee Athletic Club, Milwaukee, Wis.

FINANCE COMMITTEE

B. V. E. Nordberg, Nordberg Mfg. Co., chairman.

A. J. Lindemann, A. J. Lindemann & Hoverson Co., Milwaukee, Wis.

R. O. Messenger, The Chain Belt Co., Milwaukee, Wis.

R. P. Tell, National Brake & Electric Co., Milwaukee, Wis.

Walter Kasten, vice-president, First Wisconsin National Bank, Milwaukee, Wis.

EXPOSITION COMMITTEE

E. A. Wurster, chairman, The Falk Corpn., Milwaukee, Wis.

A. K. Birch, publicity director, Allis-Chalmers Mfg. Co., West Allis, Wis.

Fergus Mead, publicity director, The American Appraisal Co., Milwaukee.

W. J. Fairburn

Bradlee Van Brunt, publicity director, The Bucyrus Co., So. Milwaukee, Wis.

Geo. H. Fanning, sales manager, Milwaukee Locomotive Mfg. Co., Milwaukee, Wis.

B. C. Fennell, the Nordberg Mfg. Co., Milwaukee, Wis.

R. H. Stearns, Magnetic Mfg. Co., Milwaukee, Wis.

A. H. Oberndorfer, Sivyer Steel Castings Co., Milwaukee, Wis.

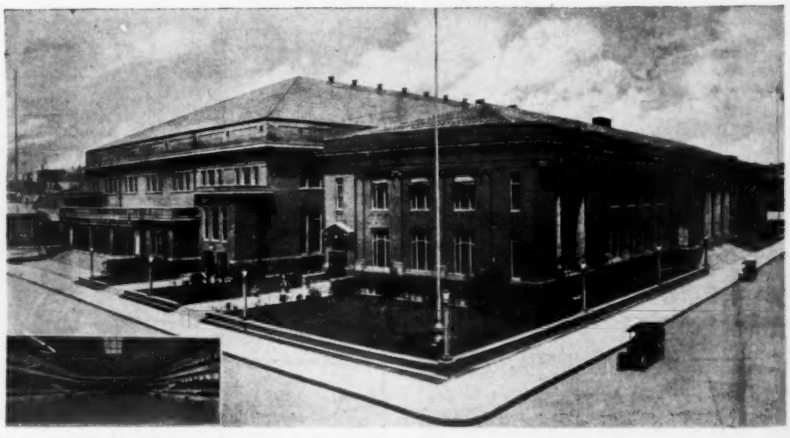
J. S. Bond, sales manager, Worthington Pump & Machinery Corporation, Cudahy, Wis.

R. A. Manegold, sales manager, Dings Magnetic Separator Co., Milwaukee, Wis.

H. S. Strouse, advertising director, Pawling & Harnischfeger Co., Milwaukee, Wis.

H. R. Brandt, advertising manager, The Chain Belt Co., Milwaukee, Wis.

M. Zaiser, The American Metal Products Co., Milwaukee, Wis.



MILWAUKEE PUBLIC AUDITORIUM WHERE THE CONVENTION IS HELD

CONVENTION OF THE AMERICAN MINING CONGRESS

The Twenty-sixth Convention and National Exposition Offers a Program Which Touches All Phases of the Question of Mining from Industrial Relations in Coal to the Open Forum on Equipment in the Metal Industry.

THE TWENTY-SIXTH Annual Convention of the American Mining Congress will be held at Milwaukee, Wis., in the Public Auditorium on September 24 to 29.

The real purpose of the annual conventions and expositions of the American Mining Congress is to bring together representatives of every phase of the mining industry, in order to cooperate intelligently in the formulation of constructive policies and the creation of a national program which will, after a careful consideration of the essential problems of the industry, make for a safeguarding of the interests of the mining industry and stimulate its further development and expansion.

The program at Milwaukee has been arranged to cover, as far as possible, the important problems which the industry confronts and no industry has ever faced more serious or more important problems than the mining industry at the present time.

For various reasons, the mining industry, particularly the coal mining industry, has been selected as the target for the attack of radical self-seekers who are interested primarily in self-aggrandizement and who are attempting to undermine the fundamental principles of American life and establish a complete governmental and bureaucratic control of industry or else the nationalization of industry itself.

A fundamental condition which has made possible this attack lies in the question of the relationship between employer and employe. It is fitting, therefore, that the question of industrial relations should be the major theme of the convention at Milwaukee and that the industrial cooperation conference should be featured as of special significance.

The road to permanent industrial peace, and therefore to permanent industrial prosperity, lies along the line of the development of mutual confidence and good will between the employer and employe. The Industrial Cooperation Division of the American Mining Congress, now functioning in 23 states, has set for itself the task, with the cooperation of mining men from all parts of the country, to work out a program which will be of real aid and assistance in securing the desired objective. The discussions of industrial relations at Milwaukee will be of real significance and they may well mark the inauguration of a new era in industrial affairs.

As the following program indicates, the convention sessions at Milwaukee have been arranged in such a way as to prevent too great a degree of overlapping and to provide for a thorough discussion and analysis of the essential problems of the mining industry.

PROGRAM

Monday, September 24, 9 *to* 5 *p. m.*

Registration of delegates, Hotel Wisconsin. 12:30 p. m.—Informal luncheon for delegates, Hotel Wisconsin. 4 p. m.—Reception for delegates and their wives and members of the Milwaukee committee, Hotel Pfister. 7:30 p. m.—Formal opening ceremonies, National Exposition of Mines and Mine Equipment of the American Mining Congress, Public Auditorium, Milwaukee, Wis.

Tuesday, September 25, 10 *a. m.*

First general session and formal opening of the 26th Annual Convention of the American Mining Congress, Convention Hall, Public Auditorium.

This session will include a presentation of the annual report of the President of the American Mining Congress and brief speeches from the leading representatives of the mining industry in various mining districts, outlining the particular problems and conditions confronting the mining industry in those districts.

Presentation of the point of view of a representative of the Federal Coal Commission, relative to the coal industry.

In order to simplify the reading of the program for the delegates, from this point on, it has been arranged under topics rather than by date.

Industrial Cooperation.

The conferences and addresses along the lines of industrial relations will be the major theme of the convention, and should be of the greatest interest to all mining men. The Industrial Cooperation Division will hold the following meetings:

Tuesday, September 25, 2 p. m.

Meeting of the Industrial Cooperation Division of the American Mining Congress, Convention Hall, Public Auditorium. This meeting will include reports of the committees, notable addresses by operating men from different branches of the mining industry.

Tuesday, September 25, 6:30 p. m.

Informal dinner under the auspices of the Industrial Cooperation Division, Hotel Pfister. Presiding officer, Sidney J. Jennings, President of American Mining Congress. Addresses will be made by Lawrence F. Abbott, president of the Outlook Publishing Co.; Edward J. Henning, Assistant Secretary of Labor; J. G. Bradley, Elk River Coal & Lumber Co.; Cleveland Dodge, Phelps Dodge Corporation and representatives of both the coal and metal mining industries.

Every employer of labor should be interested in the sessions of Industrial Relations at the Milwaukee Convention.

The Coal Industry.

The sessions devoted to the problems of the coal industry will be of outstanding importance at the convention in Milwaukee. One of the members of the Federal Coal Commission will present the point of view of the Commission in regard to the coal industry and J. C. Brydon, president of the National Coal Association, and other prominent coal operators will discuss various phases of the problems of coal.

Wednesday, September 26, 10 a. m.

The second general session of the convention which will be devoted entirely to a discussion of the coal industry. Albert J. Nason, president of the Illinois Coal & Coke Company will preside. Speeches will be made by J. C. Brydon, president of the National Coal Association; J. G. Bradley, of the Elk River Coal & Lumber Co.; Major Frank D. Rash, president of the St. Bernard Coal Co. and other prominent coal operators.

Problems of the Metal Mining Industry.
Tuesday, September 25, 10 a. m.

First general session of the convention will include several important speeches by representative leaders of the metal mining industry, indicating mining conditions in the west and some of the essential problems which are confronting the metal mining industry.

Friday, September 28, 10 a. m.

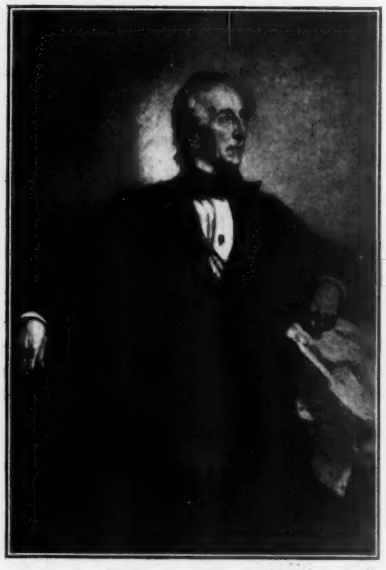
Convention Hall, Public Auditorium. This entire morning session will be devoted to a discussion of metal mining problems including particular emphasis on the problem which confronts the silver producers. It is expected that Hon. Key Pittman, Senator from Nevada, will address the convention on the work of the special senatorial commission which

(*Continued on page* 336)

NEWS OF THE MONTH BROUGHT UNDER REVIEW

Mr. Harding Was the Sixth of Our Presidents to Die in Office—Mr. Coolidge Fills a Position Which Has Been a Center of Political Storm—Relief Demanded For Overworked Executives—The Anthracite Negotiations

WARREN G. HARDING died at San Francisco, on Thursday, August 2, 1923. He was the twenty-ninth President of the United States and the sixth to die in office. The sudden death of the head of our government was enough to shock the people out of their self-centered mood. The circumstances surrounding it stirred the nation as few things have done and crystallized tendencies in an amazing number of directions.



John Tyler

The first Vice-President to succeed to the Presidency

Although such questions are wholly outside the scope of this economic review, it is especially noteworthy that the sudden death of a man supposed to be strong and in good health coupled with the trip of the funeral train from coast to coast struck a great spiritual note in the popular mind. Had it not been that most of the churches were closed for the summer, it might have been easy for the ministers to have started a great religious revival as a sorely needed backfire for too much materialism. As it is, the circumstances served to reveal the fact that our materialism is but a veneer which covers but thinly the deeper religious feelings of the people.

The Overworked President

Before the death of Mr. Harding, bulletins were issued frequently by his physicians. These were read by two groups of persons—those who were reassured by the encouraging conclusions of the attending physicians and those who in anxiety watched the telltale count of his pulse and respirations. The latter knew that the President was in grave danger; that all the evidences were of exhaustion. These men declared that the President had been worked to death. They recalled his two years and a half penned up in Washington without rest and with insufficient recreation. They recalled his start from Washington on an uncommonly hot day—and this summer has been unusually warm. They recalled his long trip through country that is proverbially hot. After this exhausting experience, he took long trips into and through our national parks and then plunged instantly into the Arctic Circle where he had, again, to endure long journeys over transportation facilities which necessarily are crude and

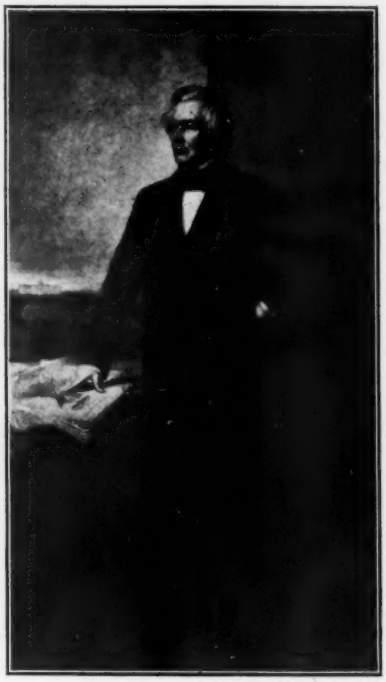
tiresome. This task done, he plunged again into another hot country.

On this long trip, he had made thirty-six formal speeches and several hundred short and impromptu addresses. Mr. Roosevelt, in his shorter tours, undoubtedly said more. Mr. Cleveland, on his shorter tours, undoubtedly covered a greater range of topics. But both of these men were dealing with subjects which, in the light of present day problems, were small and almost trivial. Mr. Harding was dealing with world problems which seem, for the minute, so grave that the world looks to the United States as the preserver of civilization. He was dealing with industrial questions which rise almost to the dignity of civil war. He dealt with political questions which may easily develop into the remaking of parties. And, he dealt with the homely problems of life and gave to the people a formula of simple living. The physical effort incident to his long

LEANING TOO HEAVILY.

trip was enough to break down a constitution of iron, the state of his health being known. The worry attached to these larger problems added an impossible load.

The undivided attention of the people has thus been called vividly to the impossible burdens which the presidency

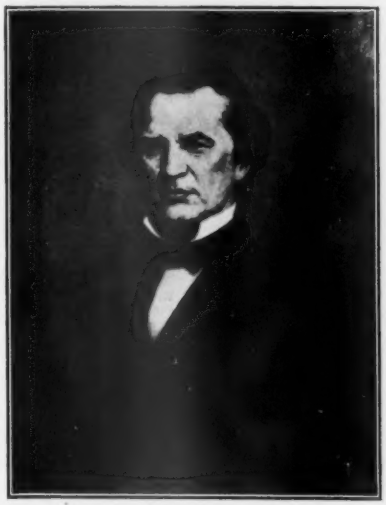


Millard Fillmore

now imposes. The knowledge that Mr. Wilson collapsed under them and that his life was despaired of, at the conclusion of his term, adds emphasis to this frightful object lesson. The conscience of the people has been pricked by these two distressing incidents coming end to end. The result undoubtedly will be the recasting of our scheme of administration to bring some relief to our overworked Presidents.

Vice-Presidential Office

When the life of a President has ended, the people have always turned their attention with more care to the



Andrew Johnson

office and person of the Vice-President. The popular conception, unfortunately, is that the office has been filled largely to satisfy the demands of the constitution and because it gave the political parties an added sectional appeal to voters. History, however, reveals that all five who preceded Mr. Coolidge were quite strong men. Obviously, our political leaders have been wiser than the people—at least in this particular.

Early in his campaign Mr. Harding had received the suggestion that the Vice-President should be made, practically, the general manager of the nation to take over the business end of the government—to put more business in government. It was proposed, thus, to release the President to his diplomatic, social and political duties. He had considered the proposed change to be too sweeping to consider as a first step. Therefore, he had modified it by inviting Mr. Coolidge to sit with the cabinet. It was undoubtedly in Mr. Harding's mind that the larger suggestion could, in time, be developed and could be made to save the President about half of his present work. It is hardly too much to expect that our next Vice-President may be called upon to handle some of the business of the government.

The discussion turns naturally on the constitutional aspects of the question. However, those who have seen the cabinet—not contemplated by the constitution—develop through statutory enactment and who have seen the powers of the President extended in the same way, have no doubt that the powers of the Vice-President could be equally extended in the same manner.

"Accidental" Presidents

Calvin Coolidge is the sixth man to have risen to the head of the government from the vice-presidency. He takes a place in history beside John Tyler, Millard Fillmore, Andrew Johnson, Chester A. Arthur and Theodore Roosevelt. Of the five who preceded him, Roosevelt alone was, later, elected to the office.

The political view of the vice-presidential office affords one of the unexplained freaks of popular government. All five have proved strong men. All five were, clearly, chosen with a view to their possible elevation. And yet all five of the men have been classified by their politi-

Out of Luck

cal sponsors as "accidental" Presidents and, with but one exception—that of Millard Fillmore—have been violently opposed by Congress which wanted, seemingly, to assume the reigns of government, with particular reference to distributing the patronage.

In the case of Tyler and Johnson, the political cabal was strong enough to give a warped popular version of naturally strong characters. Mr. Fillmore's long service as chairman of the ways and means committee of the House gave him immunity. The peculiarly dramatic circumstances of Mr. Arthur's elevation and the intensity of political feeling at that time caused his political sponsors to brand him as weak to conceal their own brutal selfishness which caused the assassination of Mr. Garfield. Mr. Roosevelt met, of course, the violent opposition of Congress but he was so quick in his decisions and so swift in his movements that he soon nonplussed his assailants.

Each one of the five—swayed by the sentiment of the hour of his succession—tried to carry out the policy of his predecessor. Each, in furtherance of this purpose, tried to retain the cabinet selected by his predecessor. Tyler was the most unfortunate in this respect, having had, in forty-seven months, practically four cabinets. Mr. Roosevelt, in seven years, made fewest changes.

Economics Involved

Martin Van Buren was President when the financial panic of 1837 broke as the result of speculation in western lands and the overdevelopment of railroads. He and Andrew Jackson had been responsible for the destruction of the United States Bank. Because he was accused of weakness in dealing with the depression, Van Buren was not re-elected.

William Henry Harrison occupied the office but one month when he died, and John Tyler succeeded him. The Tyler administration was ruined by the fight over the United States Bank. The radicals wanted to restore it and to plunge the government into paternalism. The conservatives fought it. Tyler was a conservative but his support was weakened by a great quarrel between Daniel Webster and Henry Clay—with Webster in the cabinet and Clay in the Senate.

Millard Fillmore, who succeeded Zachary Taylor, accepted at once the

Chester A. Arthur

resignation of the full Taylor cabinet. His only political tempest arose when he signed the fugitive slave bill which lost him the support of the northern Whigs. He was responsible for the banking idea that "government stocks" should be the foundation of the circulation of "national banks" and which system of banking survived in one form or another until the passage of the Federal Reserve Act.

Andrew Johnson, who followed Abraham Lincoln, became involved immediately in the reconstruction program following the Civil War. He was a Southern man who stood for a broad policy of rehabilitation. He seems to have been opposed by an element which looked upon the South as a conquered country and hence as a place for exploitation. The quarrel over this question became so intense that Congress enacted a law to strip him of the power to dismiss even Cabinet members. He called for the resignation of Stanton as Secretary of War and the latter refused. A dispute ensued which led to a motion in Congress to impeach the President.

The assassination of Garfield was the outgrowth of a political feud between the radicals and the conservatives in the party ranks. The leaders of the two sides were James G. Blaine in the Garfield Cabinet and Roscoe Conkling in the Senate. Garfield was a member of the progressive wing of his party; Arthur, his Vice-President was a representative of the conservative wing. When Garfield was assassinated by Giteau and when the latter confessed that it was his solution of the political feud, political animosities perforce took a vacation. Mr. Arthur's time was spent principally in an effort to restore harmony and won the enmity of his former supporters and turned Garfield's friends to Grover Cleveland in the next election.

When Theodore Roosevelt succeeded William McKinley, the country was in a period of buoyant industrial activity. Advantage was taken of the fact that money was plentiful to effect great combinations of industrial units. At that interesting moment the leaders in Congress decided to try to wrest control of the machinery of government from the "accidental" President. Roosevelt replied by appealing to the country for the control of the political bosses and for the limiting of the power of the aggregations of great wealth. These two campaigns started the "muckraking" era.

This hurried survey of the history of the rise of five Vice-Presidents to the highest office discloses the interesting fact that in four of the periods the country was in great turmoil, due to the same struggle between radicals and conservatives which is such a feature today. In three of the four cases the radicals failed to win their point, but succeeded in damaging the reputation of the President. Mr. Coolidge is a student of history and knows what to expect.

The Assigned Car Case

August developments around the assigned car ruling of the Interstate Commerce Commission were significant and promise to be far-reaching. The controversy before the Commission at the time this case was heard was over the question whether the railroads should be allowed to assign their own cars indiscriminately to the mines from which they drew their fuel supply. The bargain openly struck between the carriers and certain mines was that the railroads should give the mines more than their distributive share of cars, in return for which the mines were to sell the railroads their coal for less than the open market price. On that admitted statement of fact, the case went to the Commission for a decision as to the legality of the practice. The latter decided that, while the law permitted the assigned car practice, the railways would not be allowed in future to employ it—to discriminate in the distribution of cars to mines—for the purpose of getting a preferential price on their coal. It decided, however, that the assigned car practice should be kept alive, but that the exercise of it should in future be confined to the Commission itself.

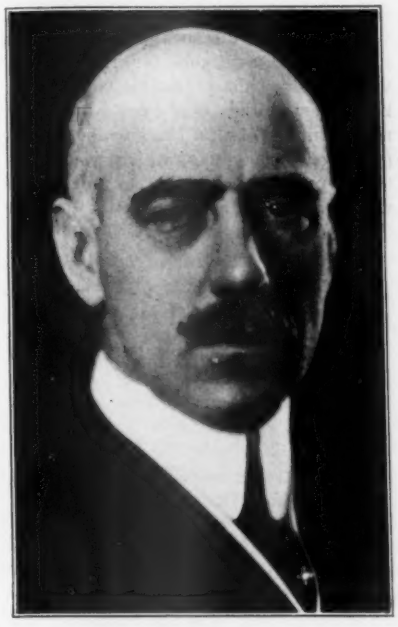
The interesting developments of the month were that two other groups were seriously affected by this ruling. Steel mills and public utilities, needing a regular supply of coal and being unable to rely upon the railroads to furnish them with cars, had purchased their own equipment. Also, a number of coal companies, having large contracts with important customers and wanting to make sure of deliveries, had also purchased their own cars. The ruling of the Commission that the right to assign cars rested solely with the Commission had the effect of depriving, in part, these private owners of the use of their equipment.

Some ten or more petitions have already been filed with the Commerce Commission, asking for a rehearing of the whole case. One of these petitions introduced an entirely new element into the situation. Some steel companies and some coal companies had purchased these cars and had financed them by the issuance of equipment notes. Certain banks had loaned money on these equipment notes and had taken possession of the cars as collateral. The money with which to pay the interest on the notes

Theodore Roosevelt

Calvin Coolidge

and to retire the principal was supposed to come from a deduction from the earnings of the cars. The instant the decision of the Commerce Commission was handed down, the banks which had handled this commercial paper went before the Commission to say that the value of



Samuel D. Warriner

the collateral supporting these loans had been seriously impaired.

The Commission recognized that a very serious question was thus raised. It had at first decided that the effective date of its order would be September 1. It has now postponed the effective date to October 1 to allow its members time in which to study the briefs filed in support of these various petitions for rehearing.

THE ANTHRACITE WAGE CONFERENCE

As was related in the last issue, the first or preliminary conference between the anthracite operators and miners at Atlantic City adjourned without agreement. The miners had demanded the check-off; the operators had refused to grant it. Two weeks elapsed without action. Then, the U. S. Coal Commission, acting on instructions from President Coolidge, asked the two sides of the controversy to meet its members in New York.

The Commission announced at once that it lay claim to no status as a board of conciliation or mediation. Therefore, it was present merely to ask, in the name of the President, one question, viz: Why cannot the operators and miners agree among themselves?

That penetrating method of procedure found its origin in the days when classical literature was being written. It was a favorite method of Benjamin Franklin. It is proving its worth today. That is when the Commission asked that question and demanded a categorical answer and when the prospects were that the answer would be given to the public by the President the exact status of the controversy was very quickly disclosed. The immediate effect was to cause the miners to withdraw their demand for the check-off, as the sole issue.

Complications, however, were instantly introduced. The miners demanded that there should be a mutual renunciation of the check-off. That is, the operators had been extending credit to the miners for powder, tools, food, clothing, and house rent—where the companies dealt in such things. The amounts due the company had been deducted from the pay envelope. The demand of the officials of the Miners' Union that this check-off should be discontinued practically amounted to cancellation of the credit of the miners with the operators.

The instant the purport of this recommendation became known the miners realized that it would prove destructive to them. That is, if the miners were on a strictly cash basis, then strikes in future would be difficult, especially in the

bituminous field. The miners realized that while they were on a strictly cash basis they could not hope to obtain credit from the operators during strikes. Therefore, in future, the union would have to finance its total membership through strikes.

Subsequent developments indicate clearly a desire to change the battlefield—from the check-off to something else. Thus in the Atlantic City conference, which was renewed on Monday, August 20, the discussion confined itself to wages and working conditions, with a great deal of emphasis on the elimination of the 12-hour day.

The discussion indicated that the 12-hour day is rather common. According to the U. S. Coal Commission, it represents only the watchmen and a few pump men who work the 12 or more hours per day and who are paid on the 8-hour basis. In all cases the men voluntarily work the longer hours to earn the larger

John L. Lewis

sums of money. The report of the Coal Commission shows that those who work the longer hours are in the higher brackets of earning capacity.

When the Atlantic City conference ended in a disagreement, the Honorable Gifford Pinchot, governor of Pennsylvania, called the miners and operators before him for a further conference. After questioning separately both sides to the dispute, he proposed that they agree on the basis of a 10 percent flat increase to all mine workers; on the universal eight hour day; on allowing the Miners' Union to have a representative in the office of the company on pay days to collect dues; and on submitting other questions to the Anthracite Board of Conciliation.

After prolonged negotiations the operators, through their spokesman, S. D. Warriner, consented to waive the demand for arbitration of disputes; the miners, through their president, John L. Lewis, accepted the 10 percent increase for the contract miners but demanded a modification of the pay of day workers. As we go to press the miners have consented to abandon the check-off and hence both sides have agreed to a new contract for two years on practically the terms of the Pinchot program. The added cost of anthracite will be 75 cents per ton.

PRESENT-DAY TRANSPORTATION NEEDS ANALYZED

Railway Managers Have Completed and Executed a Program Which is Removing Car Shortages and Giving Service—They Should be Allowed Time to Prove Thoroughly Their Capacity

By McK. W. Kriegh

(*Of the staff of the American Mining Congress*)

FOLLOWING in the footsteps of previous Congresses, the Sixty-eighth Congress, when it meets next December, undoubtedly will take a hand in the railway transportation situation. The manner in which the subject is being approached by legislators who have pronounced theories as to what is best for the railroads of the country is indicative of the kind of legislation that will be proposed. Few of those who profess accurate knowledge of railroad ills are agreed as to the remedies necessary to alleviate those ills. There will be the usual hodge-podge of proposals backed by sufficient political influence to force some sort of action by Congress.

The class most vitally interested—the railway managements—which is also the class best qualified to say what should be done, will not be permitted to exert any consequential influence in the determination of legislative policies. Therefore, any action which Congress may take is not likely to be based upon an intimate understanding of conditions gained through long association and practical experience with railroad operations.

Leaders of the factions who are contending for the repeal or amendment of the transportation act of 1920 apparently are ignoring the commendable results which are being accomplished in spite of handicaps by present railroad managements.

Few Benefits So Far

The mining industry, because of the vast tonnage it furnishes, can not stand by without protest while the railroads are being forced to bear the brunt of legislative experimentation. *Hardly an amendment to the interstate commerce act has been passed in recent years that has produced results which were helpful either to the railroads, the shippers, or the consuming public.* When the transportation act of 1920 was passed, it was thought that this legislation would stand for a period sufficient to demonstrate its strength or its weaknesses. The railroads, in good faith, have undertaken to adjust their affairs to its requirements. Every possible effort is being made to give the country efficient railway transportation.

If the present law is now changed, the healing effects of the measures that have been adopted to meet present transportation conditions will be seriously hampered. The mining industry can not afford to have a new situation created which will cause further uncertainty and difficulty in bringing the railroads to a high state of efficiency or which will postpone rate reductions on basic commodities which might be possible in the near future if the roads reach a stage of prosperity where reductions would be justified.

Shippers Want Service

Just now shippers are not so much concerned with the matter of rate reductions as with the efficiency of railroad service. Car shortages have been a serious problem. Gradually, the industries of the country are seeing a general improvement in the car supply. In order to improve service and purchase new equipment the railroads must have capital. A threatened cut in operating revenues would discourage investors who have capital available for railroad investments. This capital is needed for betterments and expansion, and any movement, *either in the form of legislation or propaganda*, which would disturb present constructive processes which are enabling the roads to haul the greatest volume of traffic in their history, *would be seriously detrimental* to the carriers' financial welfare.

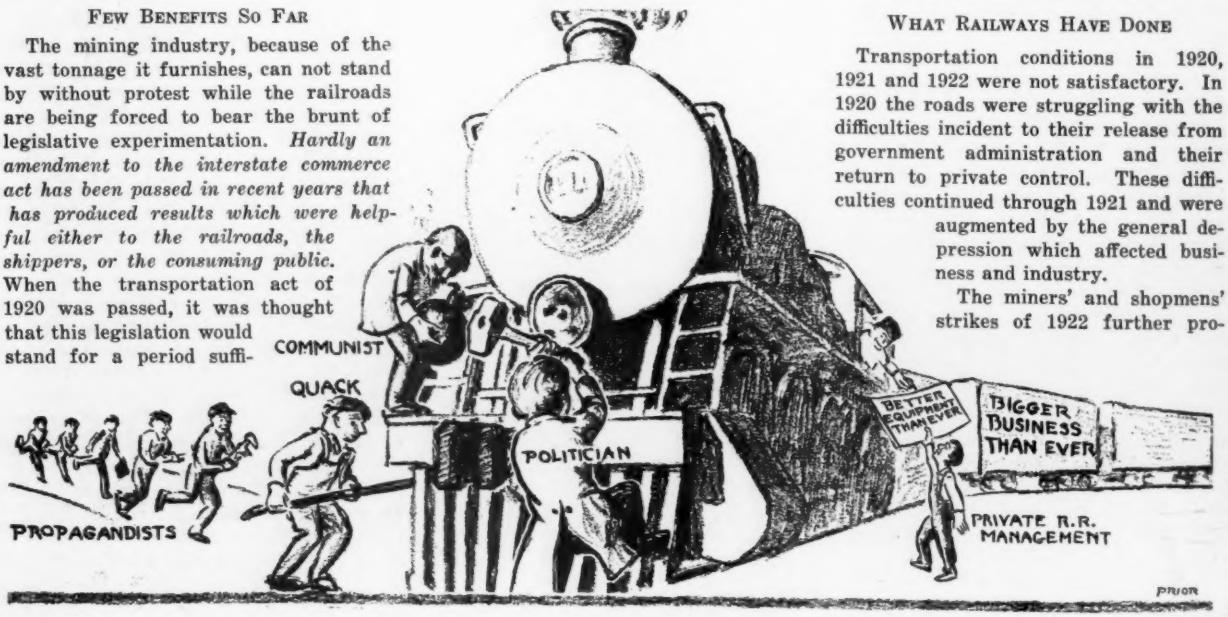
Tonnage Offsets Paper Losses

The shipping public looks forward to the day when lower rates can be secured. Many shippers of raw or basic materials believe that reductions in rates on such traffic would result in an increased volume of traffic sufficient to offset the paper loss in revenues incident to such reductions. But experience with legislative measures affecting railway transportation affords no grounds for the belief that further legislation will bring about reductions. On the contrary, experience is an indicator that new laws may result in the prolongation of present rates and possibly increases on some lines. Examination of results derived from former legislation affords no hope for future legislation that would be an improvement over interstate commerce laws and amendments of the past. Hence, the universal cry of shippers: "Let the transportation act alone."

What Railways Have Done

Transportation conditions in 1920, 1921 and 1922 were not satisfactory. In 1920 the roads were struggling with the difficulties incident to their release from government administration and their return to private control. These difficulties continued through 1921 and were augmented by the general depression which affected business and industry.

The miners' and shopmens' strikes of 1922 further pro-



longed their difficulties and the return of normal conditions.

Since the settlement of these strikes, however, great strides have been made in the improvement of all facilities. Car shortages have practically ceased to interrupt the free movement of traffic. Equipment has been repaired and new equipment has been added which has brought the car supply and number of locomotives to a point which has enabled the carriers to handle the greatest volume of traffic in their history. Loaded cars have been moved to their destinations and empty cars have been returned to shipping points with facility and dispatch.

Thus, railway transportation is approaching a standard of efficiency which, if uninterrupted by new laws, regulations, strikes or business depression, will soon meet the nation's requirements.

The Equipment Situation

Early this year the American Railway Association and the Association of Railway Executives adopted a program to improve transportation. The result is: The total cars of revenue freight loaded for the 26 weeks to June 30 was far in excess of the total for same periods in any previous years for which records exist. During this period the cumulative loading by commodities was as follows:

Grain and grain products: 1,022,730 cars.

Live stock: 826,638 cars.

Coal: 4,793,772 cars.

Coke: 390,268 cars.

Forest products: 1,902,206 cars.

Ore: 854,405 cars.

Merchandise, l. c. l. and miscellaneous: 14,222,806 cars.

Total of 24,012,825 cars.

These results were possible because the carriers were able to keep their engines and cars in proper repair and at the same time to reduce to a minimum

Hon. Henry Clay Hall
Member of the Interstate Commerce Commission

the number of engines and cars in need of repairs.

The carriers also put in service between January 1 and July 1 a total of 79,240 new cars, 31,744 of which were coal cars and 33,086 box cars.

On July 1 they had a total of 96,855 new cars on order, of which 38,736 were coal cars and 41,781 box cars.

These are expected to be available for service before the end of 1923.

Nearly 2,000 new locomotives were put in service between January 1 and July 1, and approximately the same number were on order on July 1.

The number of freight cars in need of heavy repairs on July 1 was reduced to 6.5 percent of the total number on line, estimated to be approximately 2,600,000.

There is no reason for questioning the honesty or competency of present railway management. Their efforts to make profits for those whom they represent are just as laudable as the efforts of the managers of other great enterprises. They are handicapped, however, in many respects by conditions and requirements imposed by state and federal regulatory bodies which prevent in no small degree the free exercise of individual genius.

For example, the provisions of the transportation act of 1920 which requires the roads to pay so-called excess earnings over to the government does not provide for any adjustment in favor of the roads on account of lean years, and in effect imposes a penalty on efficient management.

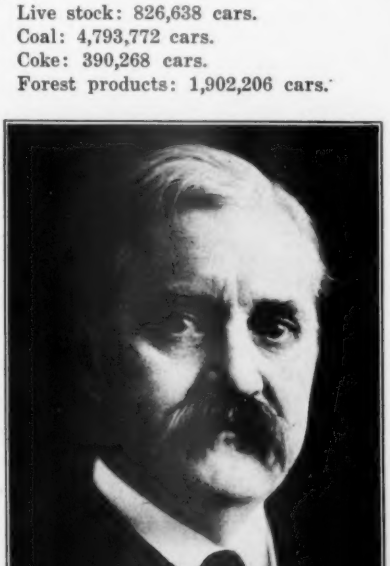
The constantly increasing state and local tax burdens, together with the 12½ percent federal income tax, constitute a severe drain upon the carriers' revenues which has an important bearing on the general rate level.

The high wage level maintained throughout the country, not alone in the transportation industry but in all other industries from which the roads purchase supplies and equipment, keeps the rate level abnormally high. From these imposed conditions there appears to be no hope of early relief.

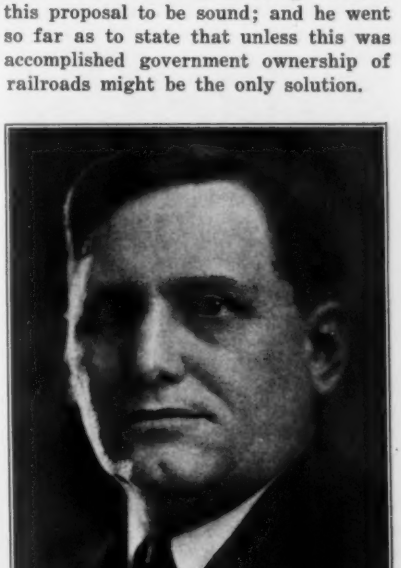
The Cummins Program

Senator Albert B. Cummins of Iowa recently outlined a program which he believes will bring about the general improvement of the transportation situation, if adopted. The principal remedy he proposes is through the consolidation of substantially all the railways into a few systems, and so consolidate them that each of the systems will, under normal conditions, after full maintenance, earn a net income that will pay a fair return, and practically the same fair return, upon the value of the property rendering the service.

The late President Harding believed this proposal to be sound; and he went so far as to state that unless this was accomplished government ownership of railroads might be the only solution.



Hon. A. B. Cummins
Chairman of the Senate Committee on Interstate Commerce



Hon. Smith W. Brookhart
A leading Progressive who is taking an active part in the discussion of transportation needs

INDUSTRIAL CO-OPERATION GIVES BUSINESS A SOUL

It Means Recognition of the Interdependence of Employer and Employe—It Demands an Understanding by Each of the Problems of the Other—It Promises a Solution of the Nation's Problem

By E. R. Coombes

Staff of The American Mining Congress

THE DIVISION of Industrial Co-operation of The American Mining Congress rests and can rest on only one foundation: The opinions and beliefs of the average worker are fundamentally sound; in his dealings the average employer wants to be and is fair-minded.

A tenet of the division is that employers and employes are interdependent; when misunderstandings occur between them no solution is enduring which does not begin with a realization of the problems of each. The groundwork of the division's platform, already endorsed by more than 5,000 mining men, embodies these basic principles:

(1) Industrial peace can be sustained only by confidence in management; such confidence can be preserved only by a closer personal touch between management and employe.

(2) Peace in industry is not promoted by organizations of employers and employes created to fight each other.

The prime requisite in all industrial relations is that the employer and employe shall have a mutual interest in the success of the enterprise. Just how this mutuality is to be attained is the disputed question. Some have advocated profit-sharing as the panacea for all industrial ills. Others believe that government ownership, control or regulation is necessary. And, still others hold steadfastly to the view that out of the present industrial unrest will come a plan so fundamentally sound that all can unite upon it.

The Division of Industrial Cooperation is made up of men who are classified in the latter group. They believe unalterably that there is a "common ground upon which employer and employe can meet." They do not care where that ground is found. It may be in the shop committee plan that gives both employer and employe a chance to be heard; it may be reached through organizations of employes who believe in maximum instead of minimum production per man; or it may be that, from discussion an entirely new idea may develop.

Labor unions are the protest of the working man against the effects on labor of the highly competitive conditions which society imposes on capital. They are a product of this age but the idea is a recurrence of a movement which is as old as civilization. That the union has gained much for the worker and that in doing so it has won much for itself is undeniable. But in its rise the weakness that seems to be inherent in all humans has appeared. The desire for power has dimmed a recognition of the great principle upon which union labor was organized. The time is approaching rapidly when by the weight of opinion within labor's ranks the union will be forced to recognize that nothing is to be gained by an orgy of shorter hours, greater pay, and minimum production. Labor will then unite to assist the employer to attain industrial peace through a recognition of the interdependence of each and the right of the consuming public.

The Division of Industrial Cooperation believes first in the necessity for a fair wage, continuous employment, and clean, healthful surroundings. All of these things are primarily problems of the employer. But after these things have been provided, it does not follow that there is a mutual interest in the success of the enterprise. If an employe is to have an interest in common with the employer, he must have some knowledge of the problems of management. He must have some avenue of approach to his employer except through his pay envelope.

The mining industry is just emerging from an era in its history that is the product of the sincere effort of the mine

operator to reach a solution of his difficulty. The pioneer who installed sanitary conditions in his camp and who built club houses and schools, was looked upon with suspicion not only by labor itself but by other employers of labor. The workers—for the most part foreigners unsued to American standards—easily were led to believe that if his employer could afford to put bathtubs in their houses he could better afford to pay them higher wages and leave bathing to their own discretion. This paternalistic effort on the part of the operator to improve working conditions led to the expectant something-for-nothing attitude of the employe which is wholly incompatible with the incentive the worker should have to himself become an employer.

The new era, just visible on the horizon, makes possible the highest of American standards and insures a different attitude on the part of both worker and employer. The secret of this new era is that the men are most satisfied because they feel that they personally have contributed to the success of the enterprise, of the town, camp or community. With a realization of personal pride in his community, his home, his job, there comes loyalty thereto, and after all loyalty is the very foundation of our nation.

As the funeral train bearing the body of President Warren G. Harding came slowly eastward, great masses of people congregated and silently paid tribute—To What? Not to Warren Harding the man, exemplary as was his life. That tribute was paid to the President of the United States—to the symbol of government. Few there were who watched these masses, composed mostly of the rank and file of the nation—the working man—that could conceive of this country being on the verge of industrial warfare or of discontent being very deep-seated in the hearts of our workers. Perhaps the one great blessing to come to the nation through the death of this great man, is a realization of the solidity with which we have builded; the deep unswerving love of the average man, high and low, for this our country. Newspapers, magazines, lecturers, and what not would have us believe that our form of government is all wrong. That we are on the verge of industrial warfare, and that the country is becoming daily more and more bolshevik. Could any demonstration have so utterly routed such statements as did the outpouring of love and reverence for our country, as was accorded its fallen leader in that solemn transcontinental trip?

Upon the mining industry has fallen a gigantic responsibility in the question of Americanization. Of the total number of immigrants who landed on our shores during the ten-year period from 1904 to 1914 a considerable percentage have been absorbed by the mining industry. For the most part these men have arrived in America with a spirit of resentment for their old environment. The vast majority speak no English. They neither understand nor appreciate American methods and they expect to be mistreated. Most of them have been ignorant, even for the countries from which they come.

Imagine, then, the problem of the mine operator who has attempted to take this crude material and develop it into the type of citizen that America is proud of. We must all admit that his task has been gigantic, and that upon him, upon his Americanization methods, in no small measure, has depended the future of our Republic. This is especially true when we consider that the mining industry employs considerably over a million men and that its workers represent approxi-

W. A. Grieves
Chairman of the Industrial Cooperation Division of the American Mining Congress

mately 5 percent of the total male wage earners in the United States. The railroads, to which the mines of the United States furnish 58 percent of their total tonnage, employ another million men, approximately half of whom are required to handle the product of the mines.

The mining industry is one of the greatest units that make up the solid entity of this country. Its influence upon our industrial independence is far reaching. It has been authoritatively said that upon the coal industry alone 1,500 major industries are dependent, and the same may be said in greater or lesser degree of every branch of the mining industry. From raw minerals to the finished mine products, the spread of industrial growth is great.

Mining today furnishes employment and luxuries for citizens in the most remote sections of this country. The development of great mining centers has brought advantages unheard of before to the very doors of our most remote centers. Possibly when the average citizen says "New Mexico," he mentally visualizes a far-off place composed for the most part of sagebrush and barren desert lands, but in reality, citizens of many sections in that state are to be envied. One of the most beautiful little cities in America is the site of the camp of the Tyrone Branch of the Phelps Dodge Corporation. At Tyrone may be found one of the finest libraries outside of a metropolis. This library is available to all those who will accept and use its facilities. The homes of the workers are attractive and well kept. There are splendid tennis courts, community baseball fields, club houses, recreation centers and playgrounds for the children. The company that has made all this possible is one of the foremost in its work on Americanization. It maintains schools for its workers, who are given a real chance to deal directly with management, to study practical mining under the direction of trained men, schooled not only in the processes of mining but in the more important things that constitute good citizenship.

As an example for comparison, let us call attention to a community situated in the heart of the farming belt of the State of Illinois. This community may be duplicated innumerable times throughout the non-mining sections of the United States. The town—approximately the size of the average mining camp—remains today, as twenty years ago, without the facilities of a public library, with no community center, with no playgrounds for the children, no community tennis courts or baseball diamonds; moving pictures are attained by traveling a distance of 20 miles; their school facilities consist of one frame building employing two teachers who guide their pupils through eight precarious grades to the acme of education for most of them. The nearest high school is 20 miles and few of the inhabitants of the community have the energy or the inclination to attain an education higher than the grade school. And yet they consider that they are living in the heart of a great industrial state and that their advantages are vastly superior to the "benighted mining communities" where the working man is a "down-trodden toiler" under "the heel of master capital." They have told me this. But compare the childhood of these future American citizens with that of the child that is permitted to live in the beautiful environment of Tyrone, or under the influence of the advantages attained at the properties of the Colorado Fuel and

Iron Co. What these two companies are doing—the Phelps Dodge Corporation and the Colorado Fuel and Iron Company—is being duplicated in a greater or lesser degree by a large percentage of mining enterprises in the United States. It will be the privilege of the MINING CONGRESS JOURNAL to carry a series of 12 articles during the year 1924 on just what 12 of the leading mining companies of the United States are doing at the great camps where coal and iron and copper and lead and zinc are being produced. The mining industry has been so busy *doing* these things that it has not taken the time to tell the world about them. It has been so engrossed in the problem of taking the raw material given us by foreign countries and making it over into useful American citizens, that the average person knows nothing whatever about its work.

Possibly, the most popular plan in evidence in the mining industry today is that known as the shop committee plan. When the Colorado Fuel and Iron Co. adopted this plan in 1915 it was referred to as "an experiment that is a radical departure from recognized methods of welfare work." This same "radical departure" has been imminently successful at this particular property and has since been adopted successfully by at least 25 representative mining companies. Its main function is the providing of an avenue of direct contact between the workers and management. Some of the companies when the plan was first put in operation complained that it gave the employe a chance to "air all their trivial grievances." That is just what it is meant to do. Most of our ills are imaginary, and when we can talk them out with somebody they become minimized, not exaggerated. It has, therefore, been found that under the shop committee plan, at first the management is flooded with "grievances" great and small, but by and by the small matters disappear and only the larger issues are developed. But each worker feels that he has had a chance to tell his side of the story.

A prominent New York banker, after reading the June issue—Industrial Cooperation number—of the MINING CONGRESS JOURNAL, wrote the editor of that publication as follows:

"If only people would get together, not merely get together but get together right, intelligently, upon a basis that is logical and consistent, not merely friendly, there would not remain much to quarrel about. The true idea of cooperation is to get together because it pays, and to pay the price incident to an effective getting together, because that too pays."

The principal plank in the platform of the Division of Industrial Cooperation is "Industrial Cooperation is good business—it pays dividends." The words "cooperation" and "welfare" are not, as is usually supposed, indicative of Utopia, up-lift work and soul stuff. Cooperation, in its true sense, is the solution to industrial ills. Not cooperation, as one brilliant writer expressed it "When the other fellow is unconscious," but cooperation that recognizes that there are two sides to every question. When industry and workers realize that mutual cooperation is the only thing that will make for continuous employment of both capital and labor, with benefits accruing to both, together with stabilized production for the consumer, the strike will become a relic of an unenlightened age.

Industrial cooperation cannot immediately cure all of our industrial ills. There is no panacea that can be applied that will overnight revolutionize industry, but there is a *common ground* upon which capital and labor may meet where an amicable solution of all industrial problems may be worked out.

The Division of Industrial Cooperation of the American Mining Congress was organized primarily for the purpose of giving information to the public as to the activities of mining companies in their efforts to attain industrial peace. The division is divided into two sections—Coal and Metal. Each section is divided geographically by states. In each state where both coal and metals are produced two committees function, each handling their separate problems. The first preliminary report of this division will be made to the 26th annual convention of The American Mining Congress at Milwaukee, Wis., September 24 to 29. On Tuesday, September 26, W. A. Grieves, of the Jeffry Manufacturing Co., Columbus, Ohio, national chairman of the Industrial Cooperation Division will make a report for the entire division. The afternoon and evening session will be devoted entirely to a discussion of industrial problems. Addresses will be delivered by such prominent authorities as Hon. D. H. Henning, Assistant Secretary of Labor; Lawrence F. Abbott, president of the Outlook Publishing Co., Cleveland Dodge, Phelps Dodge Corporation; J. G. Bradley, Elk River Consolidated Lumber Co.; Norman Schlichter, Y. M. C. A. of America, and other important mining officials.

The industrial cooperation movement offers a real solution and the conference at Milwaukee provides an opportunity for complete discussion, adoption of the principle, and a means for its practical application.

STANDARDIZATION OF MINING EXCAVATING EQUIPMENT

EXCAVATING machinery as applied to the mining industry does not present many opportunities for logical standardization.

In the first place, except in the case of a few special machines such as loaders and tunneling equipment, excavating machinery has not been designed solely for conditions encountered in the mining industry but for use in a large number of industries and for a very broad field of application. Some machines, such as the large revolving shovels, it is true, were originally developed for mining purposes and later found application in various other fields. On the other hand the dragline excavator was first developed for ditch and canal excavation and later found a field in the mining industry. Any attempt to set certain standards for such machines as applied to the mining industry alone would result in unnecessarily increasing the cost of such equipment to the mining industry without giving the industry a proportional increase in value received.

Excavating equipment today can be grouped in certain general classes according to their weights. Any attempt to adopt a set of standards according to rated dipper capacities or output, in cubic yards or tons, would not be possible due to the variations necessary to adopt a machine of a certain weight to the physical conditions encountered.

Furthermore, it is unwise to attempt to fix the detail construction of the equipment, as all excavating equipment is built to specifications developed by the manufacturer covering many years of field and experimental investigation. Manufacturers, as a rule, are alert to the opportunity to improve and redesign their product when requirements demand, and any attempt to limit this initiative would be to the detriment of active competition which is of value to the industry.

There does exist, however, an excellant opportunity for standardization work in connection with safety devices for excavating equipment. There has been a noticeable lack of cooperation in this respect in the past. Practically every mine has its own safety committee and each committee has its own ideas as to what devices a manufacturer should furnish, the result being that the manufacturer is often at a loss to know what standards to adopt for his machines.

It will be found that manufacturers are willing and anxious to lend their cooperation to any logical standardization program which will be of benefit to the mining industry.

T. A. SNYDER,
Bucyrus Company.

STANDARDIZATION PUT TO TEST PAYS DIVIDENDS

One Group of Coal Companies Adopts it, Keeps Books on it, and Announces That it Improves Running Time, Increases Production and Cuts the Cost Per Ton

By J. H. Edwards
Electrical Engineer, Elkhorn Piney Coal Mining Company, Huntington, W. Va.

DURING the last few years, a considerable amount of effort and expense has been put into the work done by the Standardization Division of the American Mining Congress,

J. H. Edwards

particularly with reference to mine machinery and equipment. One result has been to stimulate the efforts of individual companies to standardize their machinery and equipment, thereby reducing the number of different sizes and types in use, reducing the amount of spare parts carried, and thus increasing the efficiency and reducing the cost of operation. As set forth by the title, this paper will briefly outline the results accomplished through efforts to standardize in connection with a group of coal mines operated under one management.

This group of mines is situated in Eastern Kentucky and Southern West Virginia. There are six operations in the group, comprising a total of approximately 30,000 acres. Three of these operations are controlled by the Elkhorn Piney Coal Mining Company, one by the St. Clair Coal Mining Company, and two by The Youngstown Sheet and Tube Company. All of these are operated under the management of the Elkhorn Piney Coal Mining Company.

Operation No. 1, of the Elkhorn Piney Coal Mining Company, is in the New River Field of West Virginia and comprises approximately 6,300 acres. Operation No. 2 is in the Kanawha Field, and comprises approximately 10,650 acres. Operation No. 3 is in the Big Sandy Field of Eastern Kentucky and consists of approximately 4,500 acres. Operation No. 4, The St. Clair Coal Mining Company, is in the Kanawha Field, and consists of approximately 2,000 acres.

Operation No. 5, the Christian Colliery Company, owned by The Youngstown Sheet and Tube Company, is also in the Kanawha Field, and comprises approximately 2,050 acres. Operation No. 6, The Youngstown Sheet and Tube Company, in the Logan Field, comprises approximately 4,350 acres.

Five of the above operations were taken over as producing mines, with operating equipment already installed. These operations had track gauges as follows: No. 1, 44-inch; No. 2, 42 and 36-inch; No. 4, 40-inch; No. 5, 44-inch, and No. 6, 48-inch. Operation No. 3, the only one of the six which is located in Kentucky, had already been developed to a considerable extent by the Elkhorn Piney Coal Mining Company with 42-inch track gauge, before the other five plants were taken over. The above outlines two of the conditions which made standardization extremely difficult, first the fact of having to begin with operations already equipped with a wide variety of types and makes of machinery, and, second, the fact of the different existing track gauges which it was impractical to change and which made transferring of considerable equipment between properties practically impossible.

Before proceeding to describe the system used in affecting a standardization, and before going into detail with each class of equipment, it seems fitting at this point to set forth a summary of the results of standardization on the total value of mechanical and electrical repair and spare parts kept in stock at each

PART OF THE TOWN OF THE ELKHORN PINEY COAL MINING COMPANY

TABLE I

Operation	Column 1 Total inventory of mechanical and electrical spare parts carried		Column 2	Column 3	Column 4	Column 5 Tons per day potential capacity of mines	Column 6	Column 7 Amount of repair and spare pts. pr. ton of daily mine capacity	Column 8
	Maximum before reduced appreciably by standardization		After standardization affected to	Decrease column 2 minus		On same respective dates as	On July	Column 2 divided by	Column 3 divided by
	Date	Amount	July 1, 1923	column 3		column 1	1, 1923	column 5	column 6
No. 1.....	12–1–20	$40,115.41	$29,158.64	$10,956.77		1,600	2,000	$25.00	$14.57
No. 2.....	4–1–19	29,998.75	14,269.65	15,729.10		1,100	1,500	27.20	9.52
No. 3.....	4–1–19	33,169.76	19,325.79	13,843.97		1,200	1,800	27.80	10.72
No. 4.....	8–1–19	7,715.58	3,337.04	4,378.54		350	400	22.00	8.34
No. 5.....	10–1–22	15,052.02	6,669.17	8,382.85		600	800	25.10	8.34
No. 6.....	5–1–20	7,709.44	15,159.30	7,449.86*		1,200	2,000	6.42	7.58
Total net decrease.....				$45,842.37					

*An increase instead of a decrease, as this property when purchased in May, 1920, was not sufficiently protected with spare parts commensurate with the existing and proposed increased capacity.

operation. These figures show some of the direct and most tangible savings affected by standardization, but actually indicate only a minor part of the total benefits derived. The figures in Table I were worked up from the actual monthly statement of stores' trial balances:

Referring to Table I, the total net decrease of $45,832.37 was due almost entirely to reductions made possible by standardization. It is noted that in columns 7 and 8 the decrease in the amount of repair and spare parts per ton of daily mine capacity is out of proportion to the decrease in total value of parts in stock. This is because of the increase in potential mine capacity which was taking place during the same time that the standardization was being worked out.

A brief description of the method of affecting a standardization will now be given. There are two primary requirements necessary to material accomplishment in this line, first, that the specifying and supervising of all equipment be under one head and, second, that this head have accessible complete and always up to date records of every piece of machinery and equipment. The group of mines to which this paper refers has an electrical engineer with headquarters in the general operating office at Huntington, W. Va. His duties include all questions regarding mechanical and electrical equipment. All requisitions for new equipment and repair parts are checked by him and corrected when necessary. He has at hand a complete up to date looseleaf record of the machinery and equipment at each operation.

The machinery records made it possible to determine the location of similar pieces of old equipment and to plan transfers of equipment from one operation to the other, with the view of finally having only one make, and size when possible, of each class of equipment at each operation, also with a view of eliminating from any operation any type of machinery of which there is only one or a few in use, and yet for which it is necessary to carry a full line of spare repair parts. Whenever purchasing additional machinery an effort is made to obtain a type exactly similar to that already in use, so that there will be no necessity to put in stock a new line of spare repair parts. A specific instance was the recent purchase of a 30-HP. hoist for Operation No. 3. In this case a hoist exactly similar to the one already at this operation was purchased. However, when it came to the purchase of the electric motor for driving this new hoist, an alternating current motor was needed instead of a direct current motor, such as was being used on the old hoist. An alternating current motor of the size required would not be similar to any already at this operation; therefore, an alternating current motor was purchased exactly similar to one in use at another operation. This provides for an emergency transfer of repair parts between these two operations, also for a transfer of the two similar motors to the same operation whenever changed conditions or new development makes this possible. Another instance was the purchase of two mine locomotives for use at Operation No. 4. These were ordered assembled for 40″ track guage, but were so built that they can at any time be easily changed to 42″. This provides for a possible transfer of these locomotives to another operation where there are in use several others that are otherwise duplicates.

When some of the properties of this group were purchased in 1917 it was found that a large portion of the supplies and equipment were purchased by the general superintendent at each operation, the results being that at every operation a different kind of oil, grease, mine car truck, tool, etc., was being purchased by these superintendents and each one believed that no other class of material or supplies could be successfully used by him. Careful investigation showed that one kind of oil and grease could be used at all properties for similar purposes and that similar kinds of supplies, incidental equipment, tools, etc., could be similarly used at all properties. We shifted supplies, tools, etc., from one property to another avoiding the expenditure of actual cash. We were also able to make a low price contract with one of the large oil companies for the annual requirements of oil and grease for all the properties.

Table II shows the distribution of mine locomotives before standardization, and also at the date of the writing of this paper:

TABLE NO. II

Mine Locomotives

At Operation No. 1

Before Standardization	*At Present Date*
6—Goodman 10-ton haulage	6—Goodman 10-ton haulage
1—Goodman 6-ton gathering	1—Goodman 6-ton gathering
8—Goodman 5-ton gathering	10—Goodman 5-ton gathering
1—Gen. Elec. 13-ton haulage	1—Gen. Elec. 13-ton haulage
6—Gen. Elec. 5-ton comb. gathering	8—Gen. Elec. 5-ton Comb. gathering
2—Gen. Elec. 6-ton haulage	2—Gen. Elec. 6-ton haulage
1—Jeffrey 10-ton haulage	1—Ironton 5½-ton Comb. gathering
1—Gasoline locomotive	(for trial purposes)
26	29

At Operation No. 2

3—Goodman 10-ton Haul., 36″ gauge	3—Goodman 10-ton Haul., 36″ gauge
1—Goodman 10-ton Haul., 42″ gauge	3—Goodman 5-ton Haul., 36″ gauge
3—Goodman 5-ton Gath., 36″ gauge	4—Goodman 4-ton Comb. Gath., 36″ gauge
2—Goodman 5-ton Gath., 42″ guage	2—Westinghouse 5-ton Gath., 36″ gauge
2—Westinghouse 5-ton Gath., 36″ gauge	1—Gen. Elec. 10-ton Haul., 36″ gauge
1—Westinghouse 5-ton Gath., 42″ guage	1—Jeffrey 7-ton Haul., 36″ gauge
1—Gen. elec. 10-ton Haul., 36″ gauge	
1—Jeffrey 7-ton Haul., 36″ gauge	
1—Morg. Gard. 5-ton Haul., 36″ gauge	
15	14

At Operation No. 3

2—Goodman 10-ton haulage	3—Goodman 10-ton haulage
1—Goodman 6-ton Comb. gathering	1—Goodman 6-ton Comb. gathering
7—Goodman 5-ton gathering	8—Goodman 5-ton gathering
4—Gen. Elec. 5-ton Comb. gathering	5—Gen. Elec. 5-ton Comb. gathering
	1—Westinghouse 5-ton gathering
14	18

At Operation No. 4

1—Jeffrey 10-ton haulage	1—Jeffrey 10-ton haulage
1—Jeffrely 7-ton haulage	1—Jeffrey 7-ton haulage
2—Goodman 5-ton gathering	2—Goodman 5-ton gathering
2—Westinghouse 5-ton gathering	2—Westinghouse 5-ton gathering
6	6

At Operation No. 5

1—Jeffrey 10-ton haulage	1—Jeffrey 10-ton haulage
2—Jeffrey 6-ton gathering	2—Jeffrey 6-ton gathering
4—Jeffrey 5-ton gathering	5—Jeffrey 5-ton gathering
1—Gen. Elec. 5-ton Comb. gathering	
8	8

At Operation No. 6

2—Gen. Elec. 10-ton haulage	2—Gen. Elec. 10-ton haulage
13—Gen. Elec. 6-ton gathering	14—Gen. Elec. 6-ton gathering
15	16

In Table II there was a reduction of a total of seven different types, however, this was offset by the transfer of a locomotive of a different type to an operation where there were no duplicates in use, also by the purchase of two new types, making a net reduction of four. When the transfer was made it was a case of having a spare locomotive at one operation and needing an additional locomotive at another. To have avoided this transfer would at the time cost the additional investment of a new locomotive and a loss of tonnage because of delay in delivery.

STANDARDIZING THE CUTTING MACHINES SAVED $11,000 ANNUALLY

It appears rather inconsistent that during this time when an effort was being made to standardize, that two entirely new types were purchased. In one case the question of track gauge made a similar locomotive impossible and in the other case a different type was purchased in order to get a true comparison with the old standard. This naturally brings to mind a disadvantage of standardization; that is, the tendency to stick to old equipment when a new design would do the work much better. Standardization should not be carried too far. It is a matter of judgment to decide when to discard the old standard and introduce a new. The elimination of four types of locomotives has made possible a reduction of $6,000 in the stock of repair and spare parts kept on hand.

The standardization of mining machines, which will next be considered, was not hampered to any extent by the different existing track gauges, because the expense of converting a mining machine truck into any ordinary gauge is usually a small item. Table No. III indicates what was accomplished with this equipment.

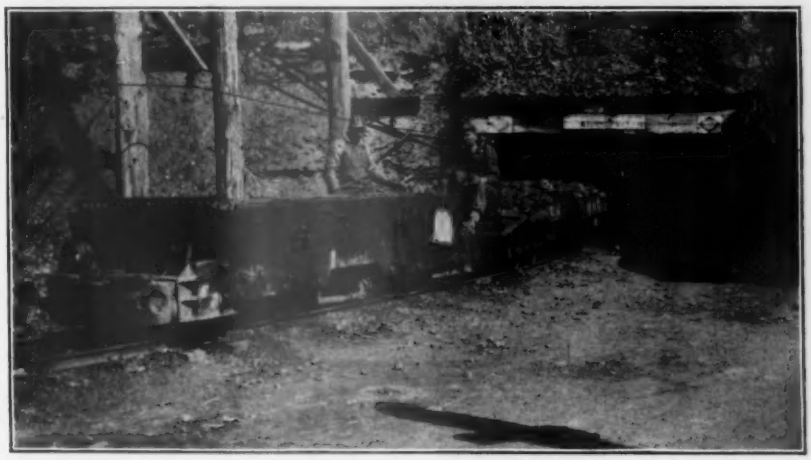
There were eliminated at all operations nine types of coal cutting machines, resulting in a reduction of approximately $11,000 in repair part stock. Most of this standardization was accomplished by transfers from one operation to another.

It must be borne in mind that when some of these properties were purchased there were old styles of locomotives and cutting machines on hand which were gradually replaced by other more modern types, and, while some of these older machines have been sold and other scrapped, there still remain some old machines which are not in active service. It must, furthermore, be remembered that the output of these mines has been materially increased since the properties were acquired and therefore more equipment in the way of locomotives and cutting machines has been required, thus making it impossible for the figures to show the real amount of reduction in equipment.

A very material advantage of standardization in coal mining by reducing the number of kinds of machines in use, is the advantage of having a mining machine operator or locomotive runner utilize day after day the same type of equipment, thus obtaining increased efficiency which is not possible where numerous classes of equipment are in use for the same purpose and when men are shifted from day to day from one kind of machine to another.

The other principal item of inside equipment is the mine car. The difference in mine track gauges and height of coal seams made transfers from one operation to another almost out of the question. Originally, the mine cars at each operation consisted of a number of types, differing not only in the type of truck used, that is plain or roller bearing, but also in the dimensions and other details of construction. A standard car was selected for each operation. Complete detail drawings were made of each design and these followed out whenever any new cars were purchased, old cars rebuilt, or when new parts were applied.

Passing to the outside equipment, the power house and substation machinery will be considered first. When taken over, Operation No. 1 was equipped with a 500-volt direct current generating plant. The mines at this operation were immediately changed to 250-volts direct current supplied by synchronous converter substations fed by purchased power. Now all six operations are using 250-volts for direct current, one supplied by a local power plant having direct current generating equipment, one supplied by substations fed from a local plant having alternating current generating equipment and four from substations fed by purchased power. All substation equipment is of the same type and make. Two standard sizes of converters were selected, these being the 200 kilowatt and 300 kilowatt. The two sizes were advisable because of the great difference in mine loads at the several substations. There would have been a considerable sacrifice in efficiency and original investment if only one size of converter had been adopted. The standardization of this equipment makes it necessary to



STANDARDIZED MOTORS WERE DIFFICULT TO INSTALL BUT JUSTIFIED THE COST

carry only three spare armatures, and other parts in proportion.

The repair shop and its equipment is often thought of as a necessary evil and consequently neglected, however, it is an important part of the plant. The operations taken over were not equipped with modern shops. New shops were built at several operations at about the same date, and duplicate machinery purchased and installed. This makes possible the keeping in stock of very few repair parts, because, when necessary, these can be transferred from one operation to another.

The same general plan of standardization is being followed out on the other outside equipment, such as coal stocking machinery, mine fans, tipple machinery, deep well pumps, hoists and especially on the electric motors which are used to drive most of this equipment. These motors are parctically all of one make and of as few sizes and types as is practical. When a new motor is needed and the requirements call for a horse power size of which there are none in use, it is the system, when practical, to purchase one of the next larger available sizes similar to some one motor or group of motors already in use. Generally, the disadvantages of higher first cost and lower electrical efficiency are far overbalanced by the saving of not having to buy additional spare parts and by the well-known operating advantage of interchangeability. This similarly reduces repair part stock and is of a special advantage when in case of trouble a spare electric motor is to be installed. The same pinion or pulley can be used, and the new motor will fit the foundation bolts of the old.

Before concluding, it seems fitting to briefly mention the standardizing of the mine engineering work. Formerly, each operation had a division engineer with the necessary office equipment and help to do the field work, map making, design and estimating for new construction, and other duties ordinarily delegated to this department. This system was changed entirely. A mine engineering office was established in Huntington, W. Va., in connection with the general operating offices. A chief engineer was put in charge of the engineering work and all map making, design and estimating for new construction, and the like, is now done in this central engineering office, instead of at the respective mines. The only men of this department who are retained at the mines are the instrument men necessary to do the field work. A system of duplicating note books is used, the original sheets being sent to the central office, where all the calculating and map working is done. Besides the main advantage of requiring a much smaller force of men this system provides for better, more accurate and more uniform work; and makes it possible to have carried out a standard method of mining.

TABLE III

Coal Cutting Machines

Before Standardization	*At Present Rate*
At Operation No. 1	
9—Goodman shortwall	8—Goodman shortwall
2—Morgan-Gardner shortwall	4—Morgan-Gardner shortwayy
1—Jeffrey 16-A breast	1—Jeffrey 16-A breast
12	13—
At Operation No. 2	
7—Goodman shortwall	10—Goodman shortwall
4—Sullivan shortwall	2—Sullivan shortwall
3—Jeffrey 17-A breast*	1—Jeffrey 17-A breast
1—Jeffrey 16-A breast*	
15	13
At Operation No. 3	
9—Goodman shortwall	12—Goodman shortwall
1—Sullivan shortwall	
1—Goodman breast*	
11	12
At Operation No. 4	
2—Goodman shortwall	3—Sullivan shortwall
1—Morgan-Gardner shortwall	
3—Jeffrey 17-A breast*	
6	3
At Operation No. 5	
1—Goodman shortwall	5—Sullivan shortwall
1—Sullivan shortwall	
1—Morgan-Gardner shortwall	
3—Jeffrey shortwall	
3—Morgan-Gardner breast*	
9	5
At Operation No. 6	
9—Sullivan shortwall	5—Jeffrey arcwall
3—Jeffrey arcwall	5—Sullivan shortwall
12	10

* Obsolete and, therefore, sold or scrapped.

ACTIVITIES OF THE COAL COMMISSION

THE U. S. Coal Commission must complete its report on or before September 22. These last days of its official life are extremely busy. Its work on the bituminous report was interrupted by the making of the anthracite report and by its efforts to bring the anthracite miners and opeartors into accord without a strike.

In addition, the Commission has been hampered by the lack of funds. The work undertaken has proved far more extensive and costly than the appropriations of Congress allowed for. Therefore, members of the staff have remained unpaid, important compilations were not finished and some reports were struck off only after considerable juggling of finances.

Even so, an amazing volume of material has been reported to the public Within the month, the Commission has amplified its first report on anthracite by publishing its indications of the cost of anthracite mining. This proved rather confusing, as two bases of computing costs were employed.

One of the most commendable pieces of work of the Commission was the study of labor relations in the anthracite field. This was the work of Dr. Willits, and proved to be both accurate and human. It was so phrased as to be most interesting.

Getting over into the preliminaries of the bituminous report, the Commission carried out its original idea of reporting by topics. It released, first, its suggestions as to the wholesalers in coal. It finds them to be a menace to the industry in times of coal shortage, but rather helpful otherwise. It indicates that their profits have been excessive in times of public emergency.

Its more recent study of the cause of strikes is, as we go to press, causing the widest and the most bitter discussion. It seems to have satisfied neither the miners nor the operators, and to have incurred the disfavor of both the radicals and conservatives. Its disposition to digress from the topic must be set down as the cause of its unpopularity.

THE PRESENT STATUS OF THE COAL INDUSTRY

Six Years of Patient Effort to Bring Coal Under Federal Regulation Culminate in a Series of Events in July, 1923. These show the Extent to Which Government Control Already is a Fact.

By George H. Cushing

TOWARD the middle of July, 1923, the coal operators began to realize what it was that they had been doing for the last six years. Prior to that time, they didn't even know that they were doing anything—except meet an ugly situation now and then and patch it.

Then, two or three stirring events came close together. When these things happened, the operators began to realize that, after all, these developments were not the result of an accident; they were but culminations. Everything which had been happening for six years pointed to them. As a result, the coal operator now realizes that he faces opposition with a "system." Therefore, he is beginning to be cautious—even though dangerously late in the day.

One event which in July, 1923, startled the coal industry was the declaration by the U. S. Coal Commission that coal is, and should be recognized to be, charged with a public interest.

In the flare light caused by that declaration, the leaders of our coal associations began to study their own legislative experience since 1917. They saw a new meaning in old things. This experience started with the passage of the Lever law, which gave the President power to fix the price on coal "whenever and wherever sold." That, of course, was a war measure, which promptly was declared unconstitutional when the war was over. Every coal man saw that phase of it—and that phase only—and the majority passed it over as a temporary annoyance.

Then, various bills were introduced in Congress, attempting to do the same thing permanently under the interstate commerce clause of the Constitution. However, the Supreme Court, in the Coronada case and the anthracite tax case, declared again that coal production is not coal commerce. Thereupon the appeal to the commerce clause was abandoned.

Carl Scholz

After that came the Calder bill, which proposed that coal should be regulated under the "general welfare" clause of the Constitution. The leading jurists of the country very quickly informed the members of Congress that that clause was designed to broaden, rather than narrow, legislation. At any rate, that effort was not pushed enough to get the bill enacted.

One effort was made by Senator Calder, even, to put coal regulation through under the taxing power of Congress.

Finally, the Coal Commission comes along with the renewal of an old proposal—that coal shall be declared to be charged with public interest. This is the new slogan upon which it is hoped that coal legislation will slide through Congress.

In the light of these and other events, the coal operators are beginning to realize that a group of persistent men is keen to exercise some supervision over the coal business. For the last six years these men have been opening one door after another to see if, by any chance, one of them wouldn't open into an avenue that would allow coal regulation to pass safely through the Constitution. Thus, in July, 1923, and for the first time, the members of the coal industry realized that for six years they had been conducting a defensive warfare against a persistent and hidden enemy that was trying by every device to break down the last vestige of privacy in the coal industry, and to drag it under supervision. Today—for the first time—the coal operators appreciate that each of these steps was not an isolated incident. On the contrary, each effort was a separate maneuver in a single campaign—to get coal under some regulation, somehow. Today, the coal industry is finally marshaling its forces for defense.

During the same six-year period there was another campaign in progress. And this other set of developments came also

J. G. Bradley

Alfred M. Ogle

to a culmination in July of this year. Specifically, in August, 1917, under the Lever law, the President appointed the U. S. Fuel Administrator. With the utmost frankness, Dr. Garfield declared that, owing to the impoverished condition of our transportation companies, it was and would be impossible to get to market enough coal to allow competition at the market to beat the price down to reasonable levels. Rather than set out patiently and courageously to build up an excess of transportation, he decided tc allow the cause to remain undisturbed while he tried to remove the effect—by fixing prices on coal, by zoning coal movements, and by dictating the method of distribution. While this theory ravished the good sense of the operators, they consented to it, and even caused their organization to become a party to it—as a war measure.

Then the war ended. But, in 1919, we had the first general strike of the bituminous coal miners. This created a situation which some anxious souls in Washington called an emergency. The instant it arose, the Fuel Administrator was called back into office. He proceeded to act on exactly the same old theory, and attempted to create the same old organization to do exactly the same old things.

This—from a governmental point of view—put "an emergency" on the same footing as a war. It assumed that during "an emergency" the enormous war powers of the President might be invoked.

In the spring of 1920 we had a strike of the railway switchmen. This congested terminals, slowed down the movement of coal and created another coal shortage. The coal shortage, naturally, brought competitive bidding among users and high prices for coal at the market. That was declared to be another emergency. Thereupon the Interstate Commerce Commission—it assumed that its powers were super-extensive in periods

D. B. Wentz

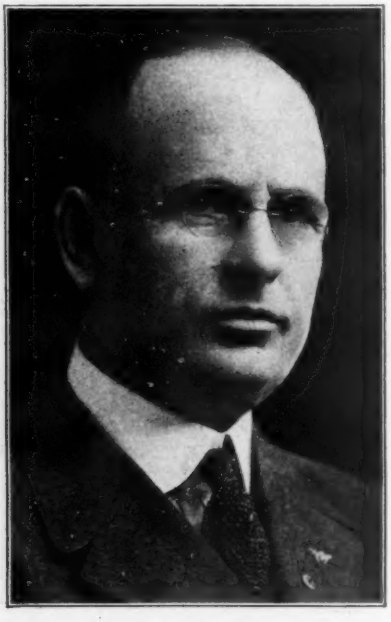
of emergency—issued the first of its "service orders." The general theory of these orders was that no operator should be allowed to have any cars in which to ship coal unless he shipped his coal to where the Commerce Commission wanted it shipped. And the Commerce Commission said that New England and the Northwest must have coal first; that all other sections of the country must wait until these two districts were satisfied. The operators then thought—and acted on the belief—that this was an isolated incident, wholly unconnected with anything that had gone before, or that was likely to come after.

However, during the continuance of this scheme of regulation, the railways had adopted the practice of "assigning" their own cars for their own fuel to those mines which would sell them coal at a greatly reduced price. For two years thereafter, the railways obtained a price lower than that ruling in the open market. The consideration was that they gave to certain operators more than their share of cars. The operators attacked this practice.

In July, 1923, the Interstate Commerce Commission issued its ruling on the assigned car practice. In doing so, it made some very frank disclosures. One of them was that the railways are inadequate. The other was that certain members—if not all—of the Commission believe that the business of the country must be regulated down to fit the size of the carriers. To that latter end, the Commission decided to keep alive the principle of the assigned car; to refuse the railways the right to use it for their own benefit; but to lodge in future the use of that tremendous power in the hands of the Interstate Commerce Commission which will exercise it through the issuance of service orders.

It was at the moment when this momentous decision was announced that the coal operators saw that this, too, was a culmination of everything they had been doing since 1917. They realized that exactly the same principles governed in this case as were set up by the actions of the Fuel Administrator in September, 1917—that transportation could not be built up and therefore business must be torn down. They saw, too, that the supposed power to enforce these amazing rulings had passed in the most logical way directly from the Fuel Administrator, in war times, to the Fuel Administrator recalled in peace times; from the Fuel Administrator to the Director General of Railroads; from the Director General, by delegation, to the Interstate Commerce Commission, and, finally, to the Interstate Commerce Commission, acting in its own name and right. And it was assuming to exercise, in perpetuity, all the powers which others previously had exercised.

In 1917, the U. S. Fuel Administrator named maximum prices, beyond which the coal industry might not go. The same thing was done in December, 1919, under the renewed powers of the Fuel



F. W. Lukins

Hugh Shirkie

Administrator. Through the activities of the Attorney General, precisely the same thing was again attempted in July and August, 1920. In June, and thereafter, in 1922, the Secretary of Commerce, by proposing voluntary agreements, attempted to set up a maximum price. Later, to police this price, he sent officers of the Navy into the mining regions to exercise a moral influence over operators. And, in the same campaign, the Interstate Commerce Commission ruled that no one should have cars unless he agreed to ship at the fair maximum prices, or less, named by the Federal Government.

While these things were going on, the coal operators assumed that each was an isolated incident. As they saw things, it had no connection with any program or any general movement on the part of governmental agencies. However, in July, 1923, the U. S. Coal Commission issued what is known as its general balance sheet. This calls for certain information from the operators covering the last ten years. When this data was demanded, the coal operators began to realize that such a compilation was valuable to the government mainly because it would allow a valuation of the coal mines. They saw that a valuation would be valuable to the government solely as a basis for price-fixing. It was then that the operators began to realize that one part of the rapidly-unfolding campaign was price-fixing in the coal industry.

P. A. Penna

Starting in 1917, a demand was made by various agencies of the government for information about the price of coal, etc. The Federal Trade Commission made certain investigations. It advocated to Congress that a definite body be set up to gather this information. After that, we had a series of bills in Congress all designed to create a fact-finding body. Later, Congress enacted the law creating the present U. S. Coal Commission.

While all this was going on, the operators believed that each of these things was a separate incident. They refused to believe that any general campaign was under way. The most that they would admit, on the contrary, was that each event but expressed the mood of some individual at some time, or his reaction to a situation then current.

It was something of a shock, therefore, to the coal industry to learn that in July, 1923, the Coal Commission had recommended to Congress the creation of a permanent fact-finding body on coal. It was equally a shock to the industry to realize that this, after all, was but the culmination of a campaign which had started in April or May, 1917. It amazed them to learn that the last recommendation was almost identical with the first, namely, that we should have uniform cost-accounting, and uniform submission of information to a permanent body, established in government.

It seems to be true that, through six years, certain forces have favored regulation consistently and have proceeded according to a regular program toward one goal—the limiting of the maximum price; the publication of all information; uniform cost-accounting; and during emergencies, the substitution of governmental agencies for the distributing organization of the coal industry.

At the minute, the leaders of the coal industry seem to have arrived at full realization of the existence of a governmental program for coal. As yet, the rank and file do not understand the situation in quite the detail here recited. At present, the leaders of the coal industry are perfecting an organization to meet the situation as it stands. As yet, they are just a little confused as to what exactly to do. Heretofore, they had gone on the belief that all of these incidents were isolated, and had to be met merely in the location from which they sprang. Now, they realize that all of these incidents are and have been tied together. Therefore they now know that, instead of fighting single battles, they have been and are conducting a war. Their present confusion, therefore, is that which naturally comes to a man who has been handling a small force and who suddenly finds himself the commanding general of an army.

PROSPERITY ON LAKE SUPERIOR IRON RANGES

THE outlook for a prosperous year on the Lake Superior Iron Ore Ranges is excellent. Going back to 1921, we find that even with the drastic curtailment of production and shipments that year, there remained on hand at lower lake docks and in furnace yards on May 1, 1922, 25,000,000 tons of ore.

During 1922 there was a continuing increase, month by month, in the production of pig iron (with the exception of August and September, when the coal strike cut off the supply of available fuel), so that all of the 44,000,000 tons of ore shipped in 1922 were consumed, and, in addition, the stocks in furnace yards and at lower lake ports were reduced by May 1, 1923, to 19,500,000 tons. So this season commenced with stocks lower than they were, for instance, in 1918, and with pig iron being produced at a record-breaking rate.

Up to August 1, 1923, the shipments amounted to 26,596,731 tons, which is approximately the same amount as moved up to the same period in 1920, when the total movement was a little over 58,000,000 tons, and, with basic conditions apparently stronger than they were that year, there seems to be no reason to believe that the movement will not be as large, and will probably amount to somewhere between 55,000,000 and 60,000,000 tons.

Shipments of Lake Superior ore for the last ten years have been as follows:

Year	Total Tonnage
1913	50,114,927
1914	32,947,591
1915	47,634,443
1916	66,902,778
1917	64,694,636
1918	63,024,220
1919	48,720,325
1920	60,531,467
1921	22,851,805
1922	44,015,530

The mines are finding employment for all of their miners, and are being efficiently operated. The railroads serving both the upper lake ports and the lower lake ports are giving good service. The boats are getting excellent despatch. So, from all angles, it looks as if the Lake Superior country will have a prosperous season.

H. A. RAYMOND,
Cleveland-Cliffs Iron Company.

MEETING A CRISIS IN THE COAL INDUSTRY

The Operators are Facing a Loss and the Miners Must Meet it by Efficiency if Wage Reductions are Avoided—How One Plan of Cooperation Works

By John H. Jones
President of the Bertha Consumers Co.

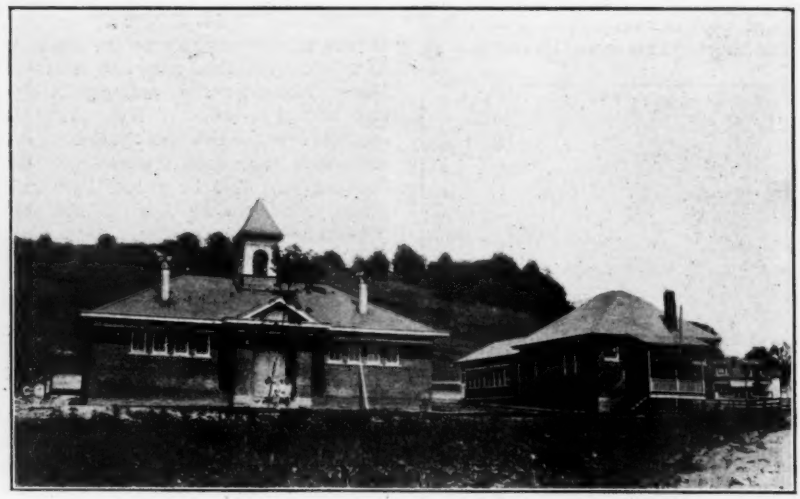
WE are facing during the coming year possibly a great crisis in the coal-mining industry. Many more mines have been developed than are necessary to supply the country's coal requirements. Consequently, at the present time, the spot market is much less than the average cost of production. With very efficient operation and favorable conditions, some coal companies will be able to make a fair return on their investment, but, with the present spot prices, 80 per cent of all coal companies are losing money. This condition will mean that many coal companies will attempt to recuperate their losses and meet present selling prices with a reduction in the mining rate. In fact, a number of reductions have already been made in certain districts.

John H. Jones

The miners have often been criticised for being insistent on certain rates and conditions, and have at times erred in making unfair demands. However, some operators have also erred. During the year 1921 and in the early part of 1922 inside day labor averaged $7.50 for 8 hours, and some contract miners made as much as $20 and $25 per day. Labor was plentiful and operators in certain districts, due to the disorganized condition of their miners, reduced the mining scale to less than one-third of that paid in the same district, thereby forcing all other fields to attempt a reduction, which led to the great strike in 1922. This condition, to a certain extent, is being repeated at the present time, and can have only one result.

If all miners and operators were conservative, it would be possible to arrive at some understanding which would be permanent. My judgment is that the plan used in England should be adopted in this country, whereby a basic scale of wages is established, enabling operators and miners to share jointly any advances in the selling price above a fixed minimum, which could mutually be agreed upon. Such a settlement followed the great strike in English coal mines in 1921 and it was a settlement brought about by the cooperation of the Government, operators and miners. Some of the operators, as well as some of the miners, in England are opposing the present system, but thus far the plan has proved very successful.

In this country we will find certain operators and certain miners who will oppose any condition tending to bring about a stabilization of the industry. Notwithstanding this, I am of the opinion that within the next two years some plan will be worked out whereby strikes will be a thing of the past in the coal industry. Public opinion will make it just as unpopular for the operators to



THE SCHOOL HOUSE AND A TYPICAL RESIDENCE

THE TOWN OF THE BERTHA-CONSUMERS COMPANY

take advantage of the miners as for the miners who attempt to force unfair conditions and use the power of their organization to force a higher wage rate than the general conditions of the country justify.

Water always finds its level. Wages paid one class of labor must be on a fair and equitable basis as compared to wages paid to other classes of labor. For instance, if miners, plasterers, bricklayers and others are making high wages, including bonus payments, and farmers, professional men and others are only making a bare living, it simply means that labor will find the highest-paid work and eventually the cost of living will increase and the farmer will get his share and vice versa.

What we want and what we will have in time is cooperation on the part of all people. It may be that we will have to pass through a crisis to bring about this condition, but there should be some plan, evolved by our government, whereby arbitration and equitable wage scales can be enforced.

We have continually urged more business in government and less government in business. My thought is that we should have more business in government, and that it should be of such nature that it will enable us to work out the problems facing the country at the present time. If the carpenter, the bricklayer, the plasterer and the miner, because they are thoroughly organized, try to take advantage of the other unorganized workmen in the country, such a condition will be unfair and cannot last. We should all do everything we can to bring about a cooperative spirit and a spirit of give and take.

Recently I made a complete tour of all the mines operated by our company. My first visit was to our Bertha and Jean mines, located at Bertha, Pa., on the Panhandle Division of the Pennsylvania Railroad. In speaking to our superintendent, Mr. Frank Hout, I asked him if we had any empty houses at Bertha mine, which was the first opening of the Bertha-Consumers Company. Mr. Hout smiled and said:

"Mr. Jones, we have practically the same men at Bertha mine now as we had when we started, some eight years ago. We very seldom have an empty house, unless some one dies."

Upon visiting our other properties in Pennsylvania, West Virginia and Kentucky, our superintendents made practically the same report.

The policy of our management is to do everything possible to make working and living conditions better for the men with whom we work. Our first aim is to make our mines safe for the workmen and then to improve the exterior of the properties and miners' homes.

The Bertha-Consumers Company has at its mines in Pennsylvania, Ohio, West Virginia and Kentucky, 287 men trained in first-aid and 106 men in mine rescue work. In order to encourage safety, as well as to take care of any men who may be injured, our company has in recent years conducted annual first-aid meets, at which representatives from the various mines compete for the honor of representing the company at the great international meets. In 1921, the team representing Johnetta mine at Johnetta, Pa., on the Allegheny Valley Division of the Pennsylvania Railroad, was successful in winning first place in the Pennsylvania championship at the International First-Aid meet held in St. Louis that year. This team also tied for fourth place with the team from British Columbia among a field of sixty-eight entrants.

MODERN TYPES OF HOUSES AT THE BERTHA CONSUMERS MINES

The Bertha-Consumers Company has endeavored to do everything possible to make living conditions enjoyable for the men at the mines by erecting well-built and attractive homes, play-grounds, schools, clubs, churches, etc., that all employes and their families might be happy and contented, thereby strengthening the morale of the organization and reducing the labor turnover which is so destructive to economic operation. These houses are rented to the employes at very nominal charges, depending on size of the home, and it is a great satisfaction to the officials of our company to note the interest and pride our employes take in properly maintaining their homes by cultivating gardens, flowers, etc. Most of our properties are accessible via automobile routes to neighboring cities and the company has encouraged the building of good roads, garages, etc., for the convenience of the men and their families.

We aim to treat our employes in the same manner as we expect them to treat the officials and directors of this company. If discord should arise it is at once corrected or the discordant note is removed.

MINERS' CHILDREN ENJOYING TH E PLAYGROUND EQUIPMENT

REVERSIBILITY OF AIR CURRENTS FOR METAL MINES

The Author Holds That no Miner is Safe Unless the Fan Can be Reversed to Draw the Gases Away From Him in Case of a Fire—Many Other Advantages Are Claimed to Offset the Relatively Low Cost of Installation

By D. HARRINGTON
Supervising Mining Engineer, U. S. Bureau of Mines

DURING the last ten years metal-mining companies have installed much mechanical equipment to circulate air underground, and considerable benefit has resulted, but, as is usual with anything new, a number of problems of a more or less unexpected nature have been encountered. Frequently not much attention has been paid to the study of these problems, and much of the effort expended on the ventilating system has been lost in so far as beneficial results are concerned; sometimes conditions have been established that place the mines and miners in a more perilous position with the ventilation than they were without it. This is particularly true of danger to mine and men from fire underground.

A well-considered, well-planned, and well-operated mechanical ventilating system at a mine is probably the best available protection from loss of life and property in the event of fire, but the establishment of high-velocity air currents without sufficient attention to such details as the method of coursing them, or of controlling and confining them, certainly tends to increase dangers from fire rather than to aid their elimination. This is proved by the fact that the greatest loss of life in metal-mine fires in recent years has been in well-ventilated workings, and in every instance the loss has been due to some more or less trivial or easily remedied defect in the ventilating system.

REVERSING AIR CURRENTS

One of the problems which has arisen in connection with mechanical ventilation of mines—both coal and metal—has been the advisability of installing main fans with provision for reversal of the air. In recent years, at least 75 percent of main fans installed at coal mines have such provision, and where main fans for metal mines can be placed on the surface, more than half are being so placed as to allow of quick reversal of air currents. Where the main fan for a metal mine must be underground (and this is frequently the situation), it is making provision for reversal somewhat more difficult, and many underground fan installations are of the non-reversing type.

The first cost of placing a fan to allow prompt reversal of currents is about 25 percent in excess of cost of non-reversible installation; and the reversal of the current is brought about by manipulation of some doors at and around the fan, and does not involve the fan itself. To make the reversal effective underground, doors must be so placed that they will not open when pressure becomes suction, or vice versa.

At present, up-to-date coal mining seems to be fairly well committed to main fans being equipped for quick reversal of main air currents, but there metal-mining men differ as to the advisability of having main fans at metal mines so equipped. In general, small fans for underground distribution of air are of the non-reversible type, and this type is necessary where flexible tubing, now very popular, especially in metal mining, is used. However, there are numerous advocates of the use of the reversing feature for booster or distributing fans, with rigid tubes to exhaust fumes from blasting, and then blow fresh air to the working face.

THE DANGER OUTLINED

The main argument against having main fans equipped for prompt and easy reversal of currents is that during the excitement caused by a mine fire or similar disaster, the air currents may be reversed without due consideration of effect on those underground, and, as a consequence, lives may be lost. This argument is substantiated by quoting an actual case in which reversal of air currents during a coal mine fire resulted in a considerable loss of life.

D. Harrington

According to the writer's information, however, the engineer who reversed the currents was compelled by outsiders who threatened his life unless he carried out their orders. Even if in this instance the reversing feature was misused, this should not condemn the principle, any more than the use of hoists should be condemned for handling men at mines because on a few occasions a hoist brake has failed to act, or a rope has broken, or a cage has pulled apart, dropping a cage-load of men to their death in the sump.

The remedy for the hoist accidents is to adopt reasonable and available precautions to prevent a repetition of the brake or other trouble, and to safeguard the use of hoists in all feasible respects; similarly, the remedy for unwise reversal of air currents is to adopt precautions such that the reversing feature will be used only when mature deliberation indicates that its use will be of benefit.

ADVANTAGES OF REVERSAL

There are numerous instances of the saving of life and property through the ability to reverse the direction of air flow with minimum delay, and, in general, the efficiency of use of the reversal feature is largely dependent upon prompt applicability; a few instances will be mentioned.

1. In one coal-mine explosion which occurred in the interior of the mine just as the last cage-load of men had gone down the upcast main hoisting shaft, the immediate reversal of air, converting the main shaft and adjacent levels from upcast to downcast, saved nearly 100 lives; some of the ingoing men had already succumbed to the poisonous fumes, and many others were resuscitated with difficulty after the fresh air reached them. If the fan had not been so equipped that reversal of the air was a matter of but a few minutes, undoubtedly all of the men going into the mine workings would have perished.

2. In another coal mine, an explosion occurred in one section during the working shift. The workers who were not killed by the violence were notified of the disaster by the concussion. They started for the surface through the usual travelway, which was the return aircourse, and but for the fact that the mine superintendent, who was on the surface, expected them to take the usual

travelway, and caused the air currents to be reversed immediately, changing the travelway from return to intake, at least 125 men would have perished. Here again promptness of action was a necessity, and had not the fan been equipped to allow of quick reversing of air, it is entirely probable that most of these men would have been killed.

Forty-five Lives Saved

3. In a metal mine equipped with fans having the reversible arrangement, fire in the main downcast shaft quickly filled the main workings with poisonous fumes, and also put the fans temporarily out of commission through cutting off electrical power. Immediately upon reestablishment of electrical connections the fans were started with air currents reversed, hence converting the burning shaft to an upcast, and allowing the escape of 14 men in one place, 25 men in another, and 6 men in a third, all of whom would undoubtedly have perished had the fans not been capable of reversing the air.

4. In another metal mine a fire broke out during the working shift in a downcast shaft, cutting off escape except by ladders in the return air-shaft. Realizing that this shaft would quickly be filled with poisonous fumes, the direction of air currents was quickly reversed by order of the general manager, the main shaft thus being converted into an upcast, and water was sparingly turned into the shaft, care being taken that the water should not baffle the upcasting air or change it again to downcast. Almost before the workers in the interior of the mine realized their danger, the fire had been controlled and they were hoisted in the usual manner at the usual time.

Fumes Are Forced Back

5. A metal mine with more or less open connections to adjacent properties was equipped with fans with reversible feature. At ordinary times the fans operated on a suction basis, but during a fire in an adjacent property from which poisonous fumes came into the mine, the fans were converted quickly to force units or blowers, and the fumes thus were forced back into the mine in which the fire was burning.

At the same time, another mine with non-reversible fan, also operating as suction unit, and also connected with the above-mentioned mine which was on fire, was compelled to suspend operations until the fire could be sealed. In the latter instance, probably temporary arrangements could have been made to reverse the air, but this was not done, though the mines with reversing arrangements at hand were used promptly, protected life and property and continued operating, probably being repaid by each day's operations for the entire cost of the installation of the reversing feature at the fans.

In connection with the recent fire at the Argonaut mine at Jackson, Calif., many persons have felt that had the fan been of the reversible type, the logical thing to have done when it was found that the fire in the downcast haulage-shaft was out of control was to have reversed the air with hope that some of the 46 men who were asphyxiated might have been able to climb the 4,000 or more feet of ladderway. Unfortunately the fan was of non-reversible setting, and it was felt that by the time temporary arrangements could be established to effect the reversal it would be too late.

A Serious Drawback

While the writer is an ardent advocate of equipping all main fans on the surface at metal mines, and most of those underground, with the reversing feature, it is realized that the reversal of air currents in a mine is a serious matter at any time, and at periods of fire or explosion should be done only through instructions from an official who fully understands the underground situation and realizes the responsibility taken. While there may be some delay in getting the presence of the official capable of giving the order for reversal, or of getting information from which to base the judgment justifying the order, usually this can be done promptly, in a few minutes or within an hour.

There have been several instances of reversal of air an hour or more after a fire or explosion, with the result of saving life or property, or both. Hence, authority to reverse direction of air-flow should devolve, and usually does rest, only upon higher mine officials who understand the underground conditions thoroughly. In the writer's experience of over 20 years in and around both coal and metal mines, he has yet to encounter an instance where anybody but an official of authority has had the foolhardiness to interfere with main air currents in a mine at any time, but more especially at time of a disaster.

The stock argument of those who oppose the reversal of air currents at time of fire or explosion in a mine is that the reversal will confuse the underground worker, who, at time of emergency, would assume that the air currents would flow in the usual direction, and in following them would be likely to be killed if the direction of the air were altered.

This argument is certainly fallacious, at least a generalization. In the first place, not 10 percent of the underground workers in metal mines, and not a much greater percentage in coal mines, have the least conception as to direction of air currents in the mine, except possibly in the main travelway towards the surface, irrespective of considerations as to direction of air-flow; there are numerous instances of this, and in many cases it has resulted in needless loss of life.

During a fire in the downcast hoisting shaft of a metal mine there were numerous instances where men had "battled" their way several hundred feet through fumes therefrom in vain attempt to reach the accustomed place for being hoisted, and later were found dead not far from the hoisting shaft. In one instance several of these men could have gone less than 100 feet from their working place (through a door) to safety, yet they forced their way nearly a quarter of a mile through smoke along their accustomed path towards the shaft, and finally came to their death. In many cases there have been coal miners who escaped death from an explosion only to die in attempting to reach the surface by following the usual travelway in the return air, which soon became filled with poisonous gases.

Generalizations Unsafe

It is unsafe to generalize as to when or under exactly what circumstances the air currents should be reversed; this is a matter to be determined by those in charge of the mine, who know not only the mine and its usual air currents, but also the existing local conditions in so far as they can be determined at the time the emergency occurs.

However, if it is found desirable to reverse the air, it certainly is a boon to be able to do so without delay, and the situation is deplorable if the means for doing so are not at hand. And it is particularly unfortunate if it is found that when the reversal is needed, and the fan is supposed to be equipped for doing so, yet on account of failure to test this feature occasionally, some defect in the system is found which either prevents the reversal from becoming effective or unduly delays it. Hence, the actual changing of direction of air currents should be tried at intervals in normal times to ensure its smooth operation when necessary.

Use in Normal Times

Ability to change direction of air currents has also very definite uses in normal working periods. When a mine with an exhaust fan receives hot, humid, or dusty air from a neighboring mine, it is nice and effective to be able to change the fan to a blower, and force back the unpleasant and unhealthful atmosphere into the mine responsible for it.

When a mine has a long haulage tunnel with cool rock, it is convenient and efficient to be able to pull the hot surface air of summer through this tunnel for cooling purposes before sending the air to the workers; and conversely, it would

be very desirable not to have to pull large quantities of high-velocity cold winter air along the tunnel, thus handicapping haulage and haulage employes. Here a reversible fan is a distinct aid to operating efficiency.

Similarly, when ice accumulates in a downcast shaft in winter, it is both convenient and profitable to be able to reverse the current and eliminate the ice. Or a mine with downcast or intake near inflammable surface buildings as in a city, for instance, can feel safer if the fan doors can be quickly manipulated and the downcast converted to an upcast within a few minutes.

These and many other operating conveniences are obtainable from equipping main fans for quick reversal of air currents, but manifestly the main reason is that of possible use in case of fire or similar disaster; and for this purpose the installation of the reversing feature is about the best and cheapest form of fire and compensation insurance known.

SUMMARY

1. All main fan installations at metal mines with fans on the surface should have the reversible feature, and, where feasible, underground main fans should also have the same arrangement.

2. In addition to the reversing feature, all fan installations should be fireproof, and all main aircourses should be so equipped with doors that, if necessary, all airflow may be closed to or from the air-course.

3. To make the reversing feature effective, mine doors should be so constructed to remain closed, even when the direction of pressure against the door changes. Occasionally, in normal times, the reversing feature should be tested to make certain of its smooth working in case of emergency.

4. Booster or distributing fans in use in metal mines to distribute air to "blind ends" need not be reversible, but should be in a fire-proof setting.

5. While there are instances of loss of life due to reversal of air currents, there are a greater number of instances of saving of both life and of property by use of that feature in both coal and metal mines.

6. Danger of reversal of air is much greater in coal mines than in metal mines, owing to the possibility of explosions, yet coal mine sentiment in favor of installation of reversing feature on main fans is almost unanimous.

7. It is no more logical to condemn the placing of the reversing feature in connection with main fans at metal mines because of one or two isolated cases of loss of life associated with reversal of air after a disaster than it is to condemn use of hoists for hoisting men, because there have been a few hoisting accidents, or to condemn use of electricity because there have been some deaths in mines from shock.

8. The cost of installing main fans with the reversing feature is but about 25 percent greater than without it. The total cost for a fairly large mine would be less than $2,500, and for an ordinary mine not as much as $1,000. In case of a desire to use this feature, the return in dollars and cents would probably be many times the above-mentioned sum, and the value returned in saving of life would be incalculable.

9. The reversing feature can be used to facilitate ordinary operations. One deep metal mine in the West uses the feature to "*cut*" ice out of the operating shaft in winter, and converts the downcast operating shaft to upcast in less than 10 minutes.

10. Any metal mine, which, for ordinary operations must for some reason or other maintain a main shaft or travelway as upcast, should certainly have the reversing feature on the fan, since a fire in the mine may at any time fill the shaft with fumes, while quick reversal would give underground men opportunity of exit through the shaft. Such shafts should also have doors at all intersections to be able to isolate the shaft from all air-flow if necessary.

11. Reversal of air currents is hazardous; of which the following may be mentioned: (a) At time of fire or explosion, changes in direction of air-flow should not be made except when it is fairly well established that good rather than harm will result.

(b) Mines with fans equipped to reverse air currents seldom use this equipment, hence at time of emergency there is undue delay in effecting the change, or in case the change cannot be brought about.

(c) Mines having fans with the reversing feature rarely have underground doors so constructed that the reversal can be accomplished.

(d) When air currents are reversed in mines with high humidity and acid water they may cause damage to metal in downcast shafts when these have been converted to upcast.

(e) Mines with much fungus and timber decay in abandoned and partly ventilated workings tend to spread fungus spores, hence extend timber decay by reversing air currents.

12. In general, very few persons care to assume responsibility for changing air flow in a mine at time of disaster; moreover, very few have the special knowledge as to the method of making the change. These conditions alone will, in general, safeguard the reversing feature from misuse.

13. The direction of main air currents should not be changed except under instructions from the mine foreman, superintendent, or other official who is familiar with the mine and its air currents, and who should also be sufficiently familiar with underground conditions at the time of making the change so that he may realize the probable effect and feel able to shoulder the responsibility.

14. The placing of the reversing feature on main fans for metal mines is a cheap and effective method of providing insurance against loss of life and property in case of fire. It pays even if never used, and it is likely to yield big "dividends"—that is to say, prevention of losses—in case it is available and is used in an emergency.

Silver Export Association Approved

The producers of silver of the west held a two-day conference at Reno, Nevada, ending on Wednesday, September 5. At this meeting the proposal was approved to form a silver export association to operate under the provisions of the Webb-Pomerene Act. This act permits those who wish to export their product to unite in one great organization; to pool their product, and to sell through a single distributing organization if desired.

The conference, which was very largely attended, selected W. Mont Ferry of Utah as chairman, and Henry M. Rives of Nevada as secretary. Among those who attended the conference were Senators Oddie, Pittman, Walsh and Gooding of the Senate Committee on Gold and Silver Inquiry.

The concrete proposal before the conference was that all of the producers of silver on the Western Hemisphere should be organized into a great combination to control the export of silver and to promote the use and sale of silver in all available markets. It was this large idea which was approved by the Conference. Considerable enthusiasm was manifest. Everybody seemed to believe that the device would prove of benefit to the distressed silver industry.

The resolution adopted authorized Chairman Ferry to appoint a committee of fifteen or more silver producers of the Western Hemisphere to carry out the recommendations.

"REVERSIBILITY OF AIR CURRENTS FOR METAL MINES"

The Author Discusses Mr. Harrington's Paper Critically and Opposes His Principal Views As Lacking in Practicability—The Advantages Which May Accrue From the Use of Mine Doors

By CHAS. A. MITKE
Chairman, Metal Mine Ventilating Committee, Standardization Division, American Mining Congress

THIS ARTICLE, on "Reversibility of Air Currents for Metal Mines," is based on the premise that "all main fan installations at metal mines, with fans on surface, should have the reversible feature, and, where feasible, underground fans should also have the same arrangement."

The Metal Mine Ventilating Committee of the Standardization Division of the American Mining Congress in its preliminary report, in 1921, made a recommendation that:

"In general, large mine fans should be reversible."

However, during the interim before the presentation of its detailed report, in 1922, the Committee had its attention called to several instances of mines in which, were the reversible equipment installed, *and used*, it would constitute a positive danger, for the reason that any reversal of air currents in the particular mines would have most disastrous results.

The discovery of these exceptions naturally gives rise to the thought that other cases might also exist of which the committee had no immediate knowledge, and that additional cases might arise in the future.

While—not by any means in the majority—mines in which such conditions prevail, actually exist, this fact cannot be ignored in the formulation of rules to govern all classes of mines.

RECOMMENDATIONS MODIFIED

The committee, therefore, while in favor of the use of the reversing equipment in cases where it was evident that reversal of air currents would prove beneficial, felt that it could not, in view of the above-mentioned exceptions, hold to its former recommendation, and therefore modified it to read as follows:

"The question of the installation of equipment permitting reversal of air currents, should depend on local conditions at individual mines."

Such a recommendation permits the use of the reversing equipment in those properties in which it is evident that it can be used to advantage, while exempting from its ruling mines in which the reversal of air currents would constitute a positive hazard.

As previously stated, the paper about to be discussed ("Reversibility of Air Currents for Metal Mines") is based on the premise that "all main fan installations at metal mines, with fans, on surface should have the reversible feature, and, where feasible, underground fans should also have the same arrangement."

This is somewhat of a modification of the author's former recommendation,* which insisted that *in all instances* main fan installations be made of such nature that reversing or changing of direction of air currents can be accomplished, if desirable, with delay of but a few moments. The present recommendation permits some leeway in the case of underground installations, but insists that all surface installations shall have the reversible feature.

Inasmuch as some of the mines constituting the exceptions referred to in the report of the Committee on Metal Mine Ventilation, are ventilated by surface installations, such a recommendation, if enforced, would compel these companies to install equipment, the use of which could have nothing but tragic results.

ADVANTAGES ARE ADMITTED

As pointed out by Mr. Harrington, and illustrated by the cases he quotes, the reversing equipment has, at times in the past, proved a decided advantage, while at others its use has been equally disastrous. He argues, however, that "cases in which reversal of air currents have caused loss of life should not be used to condemn the principle any more than the use of hoists should be condemned for handling men at mines because on a few occasions a hoist brake has failed to act, or a rope has broken," and suggests that the remedy is to adopt precautions to prevent a repetition of the trouble, "similarly, the remedy for unwise reversal of air currents is to adopt precautions such that the reversing feature will be used only when mature deliberation indicates that its use will be of benefit."

Chas. A. Mitke

This is in line with the views of the Committee, who go one step further and say, if it is known, positively, that reversal of air currents in a certain mine cannot have other than disastrous consequences, then do not increase the danger hazard, and further complicate matters, by installing the reversing equipment.

Cases are on record where the reversing equipment has proved an advantage in the past, and this type of equipment is installed in a number of mines. However, not all properties have found it advisable to install such equipment. In one large mining district the ratio of reversible to non-reversible equipment is as 25 per cent to 75 per cent, indicating that in 75 per cent of the cases it was not considered advisable to install this equipment.

The installation of such reversible equipment (as Mr. Harrington points out) is for emergency use in case it might prove desirable at time of a mine fire to reverse the air currents, although, as he states, "in general the efficiency of the reversal feature is largely dependent upon prompt applicability." Not in every case, however, is the reversing equipment made use of. In no case to date, in the 25 per cent of the metal mines mentioned above, has the reversing equipment been used at time of fire. In a recent publication, a writer on this subject also gives it as his opinion that "from reliable data at hand it is certain that in the great majority of the fires in coal mines where the main hoist-

*Page 281, Third Standardization Bulletin. Comments on Report of Metal Mine Ventilating Committee, by D. Harrington.

ing shaft was the downcast, *the fans were not reversed.*"†

As previously stated, instances are on record where lives have been saved in the past, through prompt reversal of air currents. However, recent improvements in metal mine ventilation calling for swift air currents on main levels and in main traveling ways create new hazards, as pointed out by the writer in a recent paper in the Engineering and Mining Journal,‡ and, more recently, by Mr. Harrington in the paper under discussion in the following words:

"The establishment of high-velocity air currents without sufficient attention to such details as the method of coursing them or of controlling and confining them certainly tends to increase dangers from fire rather than to aid their elimination. This is proved by the fact that the greatest loss of life in metal mine fires in recent years has been in well-ventilated workings, and in every instance the loss has been due to some more or less trivial or easily remedied defect in the ventilating system."

Such a condition as that described above causes one to wonder whether in installing reversing equipment, and in evincing such faith in its use as that displayed by Mr. Harrington, we are not misleading ourselves into believing that by so doing we have done everything in our power to protect the underground force.

Misuse of Reversing Equipment

That tragedies have occurred through misuse of the reversing equipment is an acknowledged fact, one case in point being quoted by Mr. Harrington. It is also agreed that there is danger in controlling air currents at times of mine fires by means of the reversing equipment, Mr. Harrington, in his article, stating: "While the writer is an ardent advocate of equipping all main fans on surface, at metal mines, and most of those underground, with the reversing feature, it is realized that the reversal of air currents in a mine is a serious matter at any time and at periods of fire of explosion should be done only through instructions from an official who fully understands the underground situation and realizes the responsibility taken. Hence, authority to reverse direction of air flow should devolve, and usually does rest, only upon higher mine officials who understand the underground conditions thoroughly."

Mr. Harrington goes on to state: "Reversal of air currents is hazardous," for the following reasons:

(a) At time of fire or explosion changes in direction of air flow should not be made except when it is fairly well established that good rather than harm will result.

(b) Mines with fans equipped to reverse air currents seldom use this equipment, hence at time of emergency there is undue delay in effecting the change.

(c) Mines having fans with reversing feature rarely have underground doors so constructed that the reversal can be accomplished.

(d) When air currents are reversed in mines with high humidity and acid water they may cause damage to metal in downcast shafts when these have been converted to upcast.

(e) Mines with such fungus and timber decay in abandoned and partly ventilated workings tend to spread fungus spores, hence extend timber decay by reversing air currents.

"In general, very few persons care to assume responsibility for changing air flow in a mine at time of disaster; moreover, very few have the special knowledge as to the method of making the change."

A Simpler Plan Needed

When it is so clearly recognized that the question of "when to" and "when not to" reverse the air currents is such a highly specialized problem, and that the misuse of the reversing equipment may be attended by tragic results, are we justified (in view of increasing speed of ventilating currents which has already increased the fire hazard) in contenting ourselves with such a hazardous method of protecting life, or should we search for some simpler, safer and, in fact, more fool-proof method of controlling air currents at time of mine fires than by means of the reversing equipment?

Many operators are becoming convinced that something more is needed than placing entire reliance on reversal of air currents, which, while satisfactory in certain instances in the past, may not prove so satisfactory in the future, in view of increasing velocities and increasing volumes of ventilating air, and are casting around for other methods of protecting their men.

For some years operators in the Southwest have been experimenting with various types of combination fire and ventilating doors which, when placed on all levels of mine shafts (near the shaft) and at critical points throughout a mine, will effectively control the air currents in less time than it takes to put the reversing equipment in action.

Some very satisfactory types of doors have been designated which are practically airtight and which can be controlled mechanically by any one of a number of devices, being operated from several points of vantage, both on surface and underground. These have been in use in a number of properties for some years now and have given satisfactory service. In one particular mine regular tests have proved that these doors can be completely closed within four seconds after pressing the automatic closing arrangement. It would be utterly impossible to reverse the main air currents in a mine within anything like this brief space of time.

The argument has been advanced that such doors might be out of order at time of fire and thus prove ineffective. This argument applies equally to all mechanical equipment throughout a mine, which, unless kept in repair and tested at regular intervals, cannot be expected to give satisfactory service. In the particular mine referred to above the testing of the fire doors is a matter of daily routine, and while taking but a few minutes it gives the management the assurance that should fire occur their equipment is in first-class order and ready for use.

The Use of Mine Doors

These doors, if properly constructed and tested regularly, bring the air currents to a practical standstill when closed, even though the fan may still continue running, and while there may be a small leakage of air through the doors, tests made by burning fuse at shaft stations have shown that the leakage is so slight that long before the smoke reaches the main workings the men have had ample time to reach a place of safety.

The use of these doors has the added advantage that they can be closed by anyone, from the mucker up, regardless of his experience, technical skill, or knowledge of the mine, and if they should be closed by mistake, no harm results, which is more than can be said for the misuse of the reversing equipment. It would, therefore, appear that to date the controlling of air currents by means of adequate and well-constructed doors is the safest and most fool-proof system so far devised.

Many mines already have such doors in use, and other properties throughout the country are at present installing them. That the use of such doors is an excellent precaution against disaster from fire is recognized by the Bureau of Mines, which, in a recently issued bulletin on fire and ventilation doors in metal mines (Reports of Investigations, Serial No. 2426), recommends that:

"Every main air course, whether shaft, incline, or level, should have in place, either within itself or in all the openings leading from it, a system of doors such that in case of emergency the entire shaft, incline, or level opening can

†M. W. Von Bernewitz, E. & M. Jl., Nov. 1922. "Reversing Ventilating Currents During Mine Fires or Explosions."

‡Chas. A. Mitke, E. & M. Jl.., Feb. 1923.. "Discussion of Measures for Preventing and Fighting Fires in Metal Mine Workings."

be quickly isolated from other parts of the mine. This is especially important as to downcast or intake timbered shafts, inclines, or level air courses. Doors should be provided for all openings leading from main air courses (both intake and return), and when at ordinary times there should be free flow of air the door should have a sign denoting that it is to be closed only in case of emergency * * *. It is extremely desirable that all mines be divided into air splits by doors or other means, so that a fire in any one split will be held separate from all other splits, and by manipulation of doors the fire itself isolated and controlled."

This is in line with the standard practice of a number of companies in the Southwest, and is an excellent safeguard against loss of life from fire.

Reversible Fans Superfluous

When such doors are in place and used, it can naturally be seen that the use of the reversing equipment is somewhat superfluous, as the doors, of themselves, will bring the air currents to a standstill and if the fan is shut down the leakage will be reduced to a minimum.

Mines installing such doors have found that installation of the reversing equipment is really unnecessary, as with the doors closed it is comparatively unimportant whether the fan runs in its ordinary manner or whether the air currents are reversed.

The installation of the reversing equipment in such cases does not take on the importance it might were such doors not in use, and its installation would appear to be a matter of option with the management.

The Argonaut Fire

Mr. Harrington has pointed out in his paper that, in connection with the recent fire at the Argonaut mine:

"Many persons have felt that had the fan been of the reversible type, the logical thing to have done when it was found that the fire in the downcast haulage shaft was out of control was to have reversed the air with hope that some of the 46 men who were asphyxiated might have been able to climb the 4,000 or more feet of ladderway. Unfortunately, the fan was of the non-reversible setting, and it was felt that by the time temporary arrangements could be established to effect the reversal it would be too late."

In this connection it might be well to refer to the findings of Governor Stephens' committee, as published in the December 23 issue of the Engineering and Mining Journal, to the effect that:

"The shift boss * * * should have proceeded up the shaft and upon failing to find suitable fire-fighting appliances, his next action should have been to proceed to the surface as quickly as possible and stop the Muldoon fan, or, better still, the telephone service could have been used for this purpose, by notifying the engineer to stop the Muldoon fan, even at the risk of leaving his hoist for a period, which could not have exceeded five minutes.

"The committee feels that more effective effort might have been made in immediately stopping the Muldoon fan, which would, in the opinion of the committee, have quickly reversed the air currents in the mine, causing the main shaft to work as an upcast, not only because of its greater elevation but because the fire which was said to be burning fiercely by this time, would have greatly assisted in a rapid reversal of the air currents."

From the above it would appear that loss of life was not due to the lack of the reversing equipment, as many would have us believe.

I cannot agree with Mr. Harrington's statement that "he has yet to encounter an instance where anybody but an official of authority has had the foolhardiness to interfere with main air currents in a mine at any time, but more especially at time of a disaster." This has not been my experience, nor that of many of my acquaintances in the profession.

An Act of Discourtesy

In summing up his paper, Mr. Harrington mentions the "very definite uses in normal working periods of ability to change direction of air currents." In the first place, he suggests that:

"When a mine with an exhaust fan receives hot, humid, or dusty air from a neighboring mine, it is nice and effective to be able to change the fan to a blower and force back the unpleasant and unhealthful atmosphere into the mine responsible for it."

This would seem to imply inter-mine ventilation, which is condemned by him in various other publications. (See—Tech. Paper 314, page 9, Metal Mine Fires, and Tech. Paper 251, page 40, Metal Mine Ventilation.)

If, as would appear, this is a case of inter-mine ventilation, where by reason of a mutual understanding two adjoining mines are ventilated by one mechanical system—the fresh air entering one mine, and being drawn out by an exhaust fan located on surface on the second property, it would be extremely discourteous, to say the least, for the manager of this second property to disregard his agreement with the other operator and, following this recommendation, prove himself "nice and effective" by changing the exhaust fan into a blower and force back the "unpleasant and unhealthful atmosphere into the mine responsible for it. Such procedure could hardly be termed "nice," although it might prove effective—that is, in producing litigation.

A Questionable Proposal

The second advantage pointed out is:

"When a mine has a long haulage tunnel with cool rock, it is convenient and efficient to be able to pull the hot surface air of summer through this tunnel for cooling purposes before sending the air to the workers; and, conversely, it would then be very desirbale not to have to pull large quantities of high-velocity cold winter air along the tunnel, thus handicapping haulage and haulage employes. Here a reversible fan is a distinct aid to operating efficiency."

The advantages connected with such procedure are open to question. This recommends the turning of the intake air courses and intake shaft into outlets during the winter months, which would draw the vitiated and dust-laden air from the mine workings over the men working in the main haulage ways and those traveling in the shaft. No one who has made a study of the loss in efficiency due to men working in vitiated atmospheres, or of the disastrous consequences resulting from the breathing of dust-laden mine air, as proved by the extensive studies of this subject in South America, would care to concur in this recommendation.

Other Disadvantages

A third advantage is:

"Similarly, when ice accumulates in a downcast shaft in winter, it is both convenient and profitable to be able to reverse the current and eliminate the ice."

Mr. Harrington has pointed out the disadvantages connected with such procedure, himself, in summing up his paper, when he states:

"When air currents are reversed in mines with high humidity and acid water, they may cause damage to metal in downcast shafts when these have been converted to upcast."

And again—

"Mines with much fungus and timber decay in abandoned and partly ventilated workings tend to spread fungus spores, hence extend timber decay by reversing air currents."

The last advantage mentioned is in case of fire from surface buildings, and is stated as follows:

"A mine with downcast or intake near flammable surface buildings, as in a city, for instance, can feel safer if the fan doors can be quickly manipulated and the downcast converted to an upcast within a few minutes."

There is a possibility that in this par-

(*Concluded on page* 334)

PROGRESS OF STANDARDIZATION IN THE UNITED STATES

A Summary of Forty Years of Patient Effort to Encourage Progress Without Bringing Too Great Inconvenience and Costs to the Users of Modern Mechanical Devices—The Organized Efforts

By COL. WARREN R. ROBERTS,*
Chairman General Committee, Coal Mining Branch of the Standardization Division, American Mining Congress

THIS statement of the progress of standardization in the United States is presented especially for those who are already interested in the subject.

We have endeavored to obtain information about the work on standardization from every industry engaged in such work. For such information we are indebted to the American Engineering Standards Committee and to the courtesy of many societies and associations, to all of whom grateful acknowledgment is hereby made. If we have failed to record the activities of any society or association engaged in standardization or simplification, we will be indebted to them for information about their work.

Since the American Engineering Standards Committee is the final authority on standardization in the United States, we will quote briefly from its year book for 1923 to indicate the extent of the organization which is now creating national standards for this country.

There are now 23 member bodies in this central or national organization, and 275 cooperating bodies. Each of these represents some national technical society, some national manufacturing association, some national industrial association or some governmental department. In some instances, a member body represents a group of allied industries. This statement indicates the vast extent of this central organization.

To June 1, 1923, the American Engineering Standards Committee had approved of 29 national standards; 45 standards were under consideration for approval and 121 other projects were up for consideration.

The American Engineering Standards Committee is also the medium through which those engaged in standardization in the United States may cooperate with foreign standardization bodies. Several other countries are engaged in this work and an international committee, with representatives of all these countries, has been formed to promote international standardization. At the present time Dr. Agnew, secretary of the American Engineering Standards Committee, is abroad attending conferences of this committee.

PROGRESS OF STANDARDIZATION

The progress of standardization in this country and the varied industries that have realized its advantages and are working to secure its benefits will be a surprise to those even who may be interested in it for some one industry. For some five years I have been engaged actively in this work. However, until I obtained direct information from industries and organizations, I did not know the real extent of this work. Many industries and organizations which it had not occurred to me would be interested in such work have made a very considerable progress.

The organizations which are now and have been carrying on more or less extensive work along standardization lines are:

TECHNICAL SOCIETIES

American Society for Testing Materials.
American Society of Civil Engineers.
American Society of Mechanical Engineers.
American Society of Safety Engineers.
American Institute of Electrical Engineers.
American Institute of Architects.
American Zinc Institute.
American Society of Heating and Ventilating Engineers.
American Chemical Society.
American Institute of Chemical Engineers.
American Society of Refrigerating Engineers.
American Institute of Mining and Metallurgical Engineers.
Association of Electragists.
Aero Club of America.
Electric Power Club.
Institute of Radio Engineers.
Illuminating Engineering Society.
National Research Council.
Society of Automotive Engineers.
Society of Naval Architects and Marine Engineers.
Society of Ohio Safety Engineers.

MANUFACTURERS' ASSOCIATIONS

Automobile Association.
Associated Manufacturers of Electrical Supplies.
American Tool Builders' Association.
American Foundrymen's Association.
Association of American Steel Manufacturers.
American Gear Manufacturers' Association.
Allis-Chalmers Manufacturing Co.
Aluminum Goods Manufacturing Co.
American Abrasive Metals Co.
American Atmos Corporation.
American Hardware Manufacturers' Association.
American Laundry Machinery Co.
American Radiator Co.
American Steel & Wire Co.
Baldwin Locomotive Works.
Committee of Manufacturers on Standardization of Fittings and Valves.
Clark Brothers & Co.
Corning Glass Works.
Day & Zimmerman.
Electrical Manufacturers' Club.
Edison Lamp Works.
Electrical Manufacturers' Council.
Electrical Railway Equipment Co.
Elevator Manufacturers' Association of New York.
Elevator Manufacturers' Association of the United States.
Grinding Wheel Manufacturers' Association of the United States.
Grinding Wheel Manufacturers' of the United States and Canada.
General Motors Corporation.
F. A. Hardy & Co.
International Harvester Co.
Johns-Manville, Inc.
Kaiser, Miller & Davies.
Fred T. Levy & Co.
Motor and Accessories Manufacturers' Association.
National Founders' Association.
National Association of Cotton Manufacturers.
National Association of Farm Equipment Manufacturers.
National Association of Ice Industries.
National Association of Manufacturers in the United States.
National Association of Stove Manufacturers.
National Association of Wool Manufacturers.
National Council of Lighting Fixtures Manufacturers.
National Ladder Manufacturers' Association.
National Lightning Rod Manufacturers.
National Lumber Manufacturers' Association.
National Machine Tool Builders' Association.
Otis Elevator Company.
Paint Manufacturers' Association of the United States.
Printing Press Manufacturers' Association.
The Railway Car Manufacturers' Association.
Railway Supply Manufacturers' Association.
Refrigerating Machinery Manufacturers' Association.
B. F. Sturtevant Company.
Silk Association of America.
Thompson Electric Co.
Troy Laundry Machinery Co., Ltd.
Western Electric Company.

INDUSTRIAL ASSOCIATIONS

American Electric Railway Association.
American Railway Association.
American Railway Engineering Association.
American Gas Association.
American Bureau of Shipping.
American Association of Ice and Refrigeration.
American Association of Industrial Physicians and Surgeons.
American Association of State Highway Officials.
American Automobile Association.

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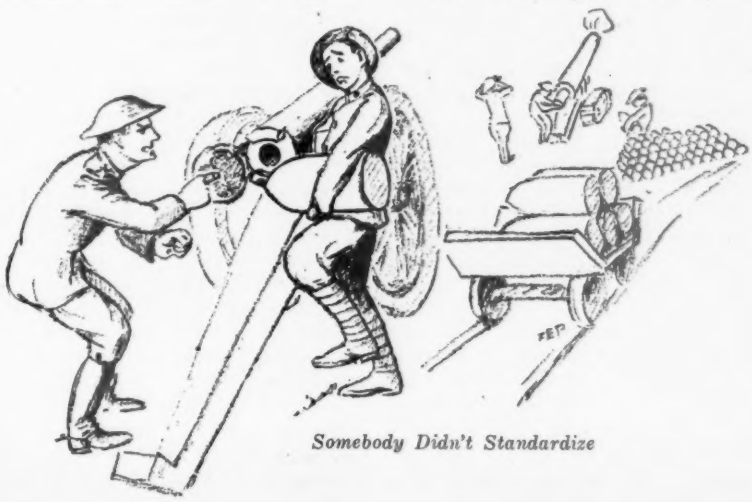
American Bureau of Welding.
American Federation of Labor.
American Forestry Association.
American Mining Congress.
American Paper and Pulp Association.
American Paper and Pulp Superintendents' Association.
American Petroleum Institute.
American Physical Society.
American Short Line Railway Association.
American Society for Municipal Improvements.
American Steamship Owners' Association.
American Supply and Machinery Manufacturers' Association.
American Telephone and Telegraph Co.
American Waterworks Association.
American Welding Society.
American Wood Preservers' Association.
American Bell Telephone Companies.
Aeronautical Chamber of Commerce.
Amalgamated Association of Iron, Steel and Tin Workers.
Association of Edison Illuminating Companies.
Association of Iron and Steel Electrical Engineers.
Association of Railway Electrical Engineers.
Associated Factory Mutual Fire Insurance Companies.
Asbestos Paper Manufacturers' Association.
The Associated Companies.
Associated General Contractors of America.
Association of Wood-Using Industries.
Atlantic Coast Ship Builders' Association.
Bridge Builders and Structural Society.
Building Officials' Conference.
Compressed Gas Manufacturers' Association.
Canadian Forest Service.
Conference of Motor Vehicle Administrators.
Copper and Brass Research Association.
Cotton-Duck Association.
Eastern Ice Manufacturers' Association.
Electrical Safety Conference.
Fire Marshalls' Association of New York.
Heating and Piping Contractors' National Association.
Hardwood Manufacturers' Institute.
International Association of Industrial Accident Boards and Commissions.
International Acetylene Association.
International Association of Fire Engineers.
International Association of Fire Fighters.
International Association of Machinists.
International Association of Municipal Electricians.
International Brotherhood of Boiler Makers and Iron Ship Builders and Helpers of America.

Col. W. R. Roberts

International Brotherhood of Electrical Workers.
International Moulders' Union of North America.
International Union of Timber Workers.
Laundry Owners' National Association.
Loyal Legion of Loggers and Lumbermen.
Lumbermen's Mutual Casualty Co
Motor Vehicle Conference Committee.
Motor Truck Association of America.
Manufacturers' Air Craft Association.
Music Industries.
Master Boilermakers' Association.



Somebody Didn't Standardize

Mellon Institute of Industrial Research.
Metal Polishers, Buffers and Platers of North America.
Metropolitan Life Insurance Co.
National Electric Light Association.
National Safety Council.
National Fire Protection Association.
National Association of Mutual Casualty Companies.
National Bureau of Casualty and Surety Underwriters.
National Association of Purchasing Agents.
National Board of Fire Underwriters.
National Association of Manufacturers in the United States.
National Warm Air Heating and Ventilating Association.
National Advisory Committee for Aeronautics.
National Aeronautical Association.
National Air Craft Underwriters' Association.
National Association of Automotive Mutual Insurance Companies.
National Association of Building Owners and Managers.
National Association of Electrical Inspectors.
National Association Master Plumbers.
New England Water Works Association.
New York City Bureau of Fire Protection.
New York City Committee on Safety.
New York City Department of Water Supply, Gas and Electricity.
North Carolina Department of Labor and Printing.
Northern White Cedar Association.
National Association of Refrigerating Engineers.
National Association of Railroad Tie Producers.
National Association of Stationary Engineers.
National Automatic Sprinkler Association.
National Automobile Chamber of Commerce.
National Automobile Underwriters' Conference.
National Council on Workmen's Compensation Insurance.
National Educational Association.
National Federation of Construction Industries.
National Hardware Lumber Association.
National Highway Traffic Association.
National Industrial Conference Board.
National Metal Trades Association.
National Paint, Oil and Varnish Association.
National Tent and Awning Manufacturers' Association.
National Tube Company.
National Varnish Manufacturers' Association.
Ohio Manufacturers' Association.
Ontario Pulp & Paper Makers' Safety Association.
Optical Society of America.
Optical Manufacturers' Association.
Philadelphia Housing Association.
Postal Telegraph Co.
Prudential Insurance Company of America.
Pacific Logging Conference.
Pattern Makers' League.
Railway Fire Protection Association.
Dwight B. Robinson Co.
Rubber Association of America.
State of Wisconsin Railroad Commission.
State of Wisconsin Industrial Commission.

State of Tennessee Railroad and Public Utilities Commission.
State of Massachusetts Department of Labor and Industries.
State of Michigan Department of Labor and Industry.
State of Minnesota Department of Labor and Industries.
State of Montana Public Service Commission.
State of New Jersey Board of Public Utility Commissioners.
State of New Jersey Department of Labor.
State of Oklahoma Corporation Commission.
State of Pennsylvania Department of Labor and Industry.
State of Pennsylvania Industrial Board.
State of California Industrial Commission.
State of Connecticut Public Commission.
State of Illinois Commerce Commission.
State of Illinois Department of Labor.
State of Indiana Public Service Commission.
State of Iowa Board of Railroad Commissioners.
State of Maine Public Utilities Commission.
State of Maryland Public Service Commission.
State of New York Board of Fire Underwriters.
State of New York Industrial Commission.
State of New York Public Service Commission.
State of New York Transit Commission.
State of Pennsylvania Public Service Commission.
Society of Motion Picture Engineers.
Sheet Metal Ware Association.
Society of American Foresters.
Southern Pine Association.
Southern Supply and Machinery Dealers' Association.
Stone & Webster, Inc.
Thompson-Starrett Co.
Underwriters' Laboratories.
United Brotherhood of Carpenters and Joiners of America.
U. S. Chamber of Commerce.
U. S. Independent Telephone Association.
U. S. National Committee of the International Commission on Illumination.
West Coast Lumbermen's Association.
Western Association of Electrical Engineers.
Western Red Cedar Association.
Western Union Telegraph Co.

GOVERNMENT AGENCIES

Association of Governmental Labor Officials.
Federal Ship Building Company.
Federal Power Commission.
Interstate Commerce Commission.
U. S. Federal Specification Board.
U. S. Employes' Compensation Commission.
U. S. Postoffice Department.
U. S. Shipping Board.
U. S. Treasury Department—Supervising Architect's Office, U. S. Coast Guard and U. S. Bureau of Public Health Service.
U. S. Department of the Interior—U. S. Bureau of Mines.
U. S. Department of Commerce—National Bureau of Standards, Bureau of Light Houses and Division of Simplified Practice.
U. S. Public Health Service.
U. S. Department of Agriculture—Bureau of Public Roads, Forest Service and Weather Bureau.
U. S. Department of Labor—Bureau of Labor Statistics and Women's Bureau.
U. S. Navy Department—Bureau of Construction and Repair, Bureau of Engineering, Bureau of Navigation and Yards and Docks.
U. S. War Department—Air Service, Corps of Engineers and Quartermaster Corps.

TECHNICAL SOCIETIES

I have received reports from only five of the technical societies listed, as actively interested in standardization, but their reports will suffice to indicate the character and extent of the work which these societies are doing on standardization.

American Society for Testing Materials: The secretary advises as follows:

"The standardization of specifications and methods of testing is carried out for the most part by standing committees. Some forty of these technical committees have been organized, each committee dealing with one particular class of material, such as steel, iron and non ferrous metals and alloys; cement, lime, gypsum, brick, concrete and refractories; paints and oils, petroleum products and lubricants, road materials, coal and coke, timber, insulating and waterproofing materials and rubber products. These committees are all organized so as to consist of both non producers and producers, the requirement being made that the producers shall not predominate. The non-producers comprise both consumers and experts not affiliated with either producers or consumers. The standing committees are thus in a position to prepare specifications that will insure a satisfactory product which, at the same time, can be produced commercially.

"Methods of test as developed by the committees are often the result of much investigational work, generally of a collaborative nature, each member of the committee in a position to participate being asked to do so. The U. S. Bureau of Standards and other federal and state bureaus also cooperate in many of these investigations.

"Methods of test frequently must be developed before any standardization of specifications can be begun. When the proper tests of a material have once been determined upon and standardized, requirements for the material when subjected to these tests can be decided upon.

"Specifications and methods of test, after having been formulated by a technical committee, are submitted to the society as a whole. If accepted, they are published for at least one year, thus affording an opportunity for criticisms to be transmitted to the appropriate committee, which will be given consideration before the tentative standard is recommended for advancement to standard. After having been published as tentative, a specification or method of test may then be advanced to standard.

"In this way, the society has developed 172 standards and has published 163 that are still tentative. The following are some of the materials which the standards and tentative standards cover:

Steel Rails and accessories.
Structural and boiler steels.
Reinforcement bars and wire.
Steel blooms, forgings and axles.
Steel wheels and tires.
Steel castings.
Steel tubes and pipe.
Automobile steels.
Bar and tool steels.
Magnetic properties of iron and steel.
Chemical analysis of iron and steel.
Heat treatment of steel objects.
Wrought-iron pipe, bars and plates.
Pig iron.
Cast-iron pipe and wheels.
Malleable and gray iron castings.
Ingot copper.
Spelter, nickel and lead.
Aluminum alloys.
Copper wire and cable.
Brass and bronze products.
Babbitt and solder metal.
Chemical analysis of non-ferrous alloys.
Cement, brick and hollow building tile.
Drain tile and sewer pipe.
Lime, gypsum and gypsum products.
Refractories.
Concrete and concrete aggregates.
Oils, Shellac and pigments.
Petroleum products and lubricants.
Road materials.
Coal and coke.
Timber and timber preservatives.
Shipping containers.
Insulating materials.
Waterproofing materials.
Rubber products.
Textile materials.

"In its standardization work, the society has cooperated with many other national technical societies. It maintains conference committees with some of them, as with the Boiler Code Committee of the American Society of Mechanical Engineers, and has official representatives on standing committees of some other societies, such as the Society of Automotive Engineers. The Society is a member society of the American Engineering Standards Committee and has been designated the sponsor or joint sponsor for several of the standardization projects before that body. Seventeen standards of the society have been approved as 'American Standard' or 'Tentative American Standards' by the Standards Committee and the society has submitted to it twenty-five others."

American Society of Mechanical Engineers: The secretary reports that their work on standardization is carried on through committees, and that they have been producing standards since 1886, as is evidenced from the following list of standards which this society has formulated:

226—Standard pipe and pipe threads (1886).

1054—Standard abbreviations, symbols, punctuation, etc., in technical papers (1904).

1142-1142-A—Standard proportions for machine screws (1907).

1305—Report of committee on "Identification of Power House Piping" (1911).

1367—Developments in machine shop practice during the last decade (1912).

1378—The present state of the art of industrial management (1912).

1394—Standard sizes of catalogues (1913).

1398—Standard threads for fire hose couplings (1913).

1399—Standards of pipe thread gages (1913).

1430—American standard for pipe flanges, fittings and bolting (1914).

1468 — Standard cross-sections and symbols (1914).

1469—Rules for the construction of stationary boilers and for allowable working pressures (1914) (power boilers).

1474—Standards of special threads for fixtures and fittings; rolled threads for screw shells of electric sockets and lamp bases (1915).

1510—Standardization of safety principles (1915).

1523—Safety code for the use and care of abrasive wheels (1915).

1525—Standards of special threads for fixtures and fittings; for straight pipe threads (1915).

1526—Rules for conducting performance tests of power plant apparatus (1915).

Test code for boilers.

Test code for reciprocating steam engines.

Test code for steam turbines.

Test code for pumping machinery.

Test code for compressors, blowers and fans.

Test code for complete steam power plants.

Test code for locomotives.

Test code for gas producers.

Test code for gas and oil engines.

Test code for waterwheels.

1572—Code of safety standards for cranes (1916).

1597—Code of safety standards for industrial ladders (1917).

1598—Code of safety standards for power transmission machinery (1917).

1600—Report of committee on "Recommended Practice for Standardization of Filters" (1916).

1631—Code of safety standards for woodworking-machine guards (1917).

1654—American standard for pipe flanges, fittings and bolting; low-pressure standard (50 pounds); hydraulic standard (800 pounds, 1,200 pounds and 3,000 pounds (1918).

1778—A safety code for locomotive boilers (1921).

A safety code for elevators (1921).

A safety code for miniature boilers (being printed, 1923).

x101—Joint committee on standards for Graphic presentation (1917).

x(6)—Style sheet (1904).

American Institute of Electrical Engineers: The secretary reports that they have been actively engaged in standardization for many years, and furnished a copy of their book of standards revised up to 1922. I wish to quote the following statements from this book of standards, indicating the purpose, scope and method of developing standards by this society:

"In framing these standards, the chief purpose has been to define the terms and conditions which characterize the rating and behavior of electrical apparatus, with special reference to the condition of acceptance tests. It has not been the purpose of the standards to standardize the dimensions or details of construction of any apparatus, lest the progress of design should be hampered."

I wish the reader to especially note the wisdom of this society in obtaining for their industry the benefits of standardization without in any way hampering the inventive genius applied to the development of this great industry.

This society first took up the consideration of the standardization of generators, motors and transformers in 1898 and in 1899 a report of the committee appointed for this purpose was accepted and the rules embodied became the authoritative basis of American practice.

This society, through its committees on standardization, has been actively engaged in this work since the above date and their report for 1922 indicates that within the scope of limitations set for the standardization of electrical machinery and equipment that the entire field of such equipment has been thoroughly standardized. In fact, there is doubtless no other industry where the benefits of standardization have been greater than that attained by the electrical industry.

The Electric Power Club: The letterhead of this club states that it is an association of manufacturers of electric power apparatus and control equipment, organized for the standardization, improved production and increased distribution of such products.

The president of this club advises me that they have been engaged in the standardization of electric power equipment and control equipment for the last fifteen years and, with a view to still further reducing the number of standard sizes, styles and types, this organization has recently made some of its standards preferred standards, with the idea that within a few years the non-preferred standards can be eliminated.

The rules of The Electric Power Club include standards for the building and testing of electric motors, generators, tools, locomotives, transformers, welding equipment, control equipment, switchboards and switching equipment. The club has also adopted standard rules for the proper selection of oil circuit breakers, adequate inclosures for controllers, limitations on the use of belts, gears and two-bearing motors, proper cutting speed for different grinding wheels, nomenclature, general engineering, recommendations and other rules for the proper installation, care and operation of the different kinds of electric power apparatus, coming within the scope of the club's activities.

All of the standards of this club are contained in their pamphlet, which is now in its 14th edition.

Society of Automotive Engineers: This society believes in the benefits of standardization and has been actively engaged in such work for the last eleven years, developing and perfecting its work through standards committees.

From a review of the annual standardization number of the journal of this society, it is evident that many men prominent in the industry are actively interested in the standardization of all the products represented by this society.

I do not find in the reports of the various divisions to the standardization committee any résumé of the standards created by this society, but I find listed some fifty pages in this journal of standards already created and those covering revisions of such standards.

Other Technical Societies: All the other technical societies listed above are more or less active in standardization, as indicated by their being either members or cooperating members of the American Engineering Standards Committee. However, we have not received reports from any of these other technical societies.

(*Concluded in the October Issue.*)

COPPER AND BRASS PRESENT THEIR CASE TO THE PUBLIC

By WILLIAM A. WILLIS,
Manager, Copper & Brass Research Association, New York

THE DOMINIE of a little Ohio church, in the year 1845, voiced a protest against the steam locomotive by saying that the Creator had obviously never intended his children to travel at so truly startling a speed as fifteen miles an hour! Yet, the grandchildren of this same old dominie ride to church on Sunday morning in one of the thirteen million automobiles which traverse about fifty billion miles of road annually in this country, and only deign to travel that slowly when the traffic policeman is looking. From a few miles of railroad, halting and uncertain in operation, we now have more than a quarter of a million miles, over which we travel, in comfort and confidence, at a speed of three, four or even five times that which caused the dominie's lament; and not long ago we were all sorely disappointed because the effort to cross the continent between the rising and setting of one day's sun failed by a narrow margin.

It is not yet a century since Faraday, on a bleak October day in the year 1831, took a disc of copper and mounted it between the poles of a horseshoe magnet. Rotating the disc, he produced an electric current. Today, something like $5,000,000,000 is invested in the eletrical industry—an amount which exceeds the total of the entire national wealth at the time Faraday made his epochal experiment—and soon one-half of America's twenty-four million homes will be electrically lighted.

OUR EAGER YOUTH

All this has taken place in less than a century, and all industry has developed in much the same breath-taking manner. Progress in mining and metallurgy, chemistry and mechanics, in science and invention generally, has literally stormed the world and conquered the forces of nature. The consuming public has been the great gainer from this rapid industrial growth; but kaleidoscopic changes in the processes whereby we are fed, clothed, sheltered, transported and amused have wrought a great change in the public mind; they have, above all else, created a certain instability that finds its principal manifestation in the feverish eagerness with which we embrace that which is new simply because it is new, with never a thought of comparing values with the old.

The very beneficent character of most of the inventions of our great industrial age is, of course, the underlying explanation of this atrophied sense of real values. The consumer feels instinctively that the new is better than the old; and new has to a surprising extent actually become synonymous with best. The science of production has literally submerged the art of discriminating consumption.

Right here is the reason why the producers of so many of the oldest, the most useful, and once most used materials have found it necessary to take measures to restore the popularity of their products. This is the explanation of a recent widely noted prenomenon—which sees producers of wood, shoeleather, stone, metals, and many other products using strenuous measures in the strenuous task of reclaiming channels of consumption that for no sound reason had been lost or were slipping.

No industry had more cause to view this tendency on the part of the consuming public with greater gravity than the copper producer and his principal customer, the brass manufacturer. From the first vague beginnings of civilization copper was the metal around which man built his progress. Ten thousand years ago he used it for his first tools and weapons, to lift himself out of the age of stone, precisely as today he is using it to induct himself into the age of electricity—for copper and electricity, as is now well known, are one and inseparable.

SUBSTITUTES INTRODUCED

But while growing quantities of copper were finding their destiny in the field of electricity, industrial development had brought a whole host of cheap substitutes for copper and brass which, by dint of energetic, capable advertising and intensive selling methods, have been able to take fullest advantage of the present state of mind of the buyer, valuing, as it does, a product in proportion tc its newness and the forcefulness with which it is promoted. One substitute after another came into the field, and the war, during which brass and copper were perforce completely absorbed for munitions and the like, served to give these substitutes an even wider opening.

William A. Willis

But the war merely accentuated the necessity of taking vigorous measures to reclaim markets which logically belonged to copper and its alloys. To meet this clearly defined need the Copper and Brass Research Association was formed in 1921, by 37 copper producing and copper and brass manufacturing companies. In addition to the founding companies, eight additional members have recently been elected to membership.

The work of this association roughly speaking divides itself into two main parts: (1) The dissemination to the public of facts and information about copper and brass, through carefully planned educational and advertising effort; and (2) Technical and commercial research designed to encourage consumption by demonstrating proper methods of application and use, by improving methods of distribution through widespread dealer cooperation, by seeking to standardize processes of manufacture, etc.

Here is how the educational work has been developed. An effort has been made to secure the maximum public interest in copper and brass by giving currency to information about these metals which had a genuine interest value. A case or two in point will serve to demonstrate how this has been done (and it is a sphere of effort which represents the antithesis of what has come to be called the method of the press agent). Sometime ago, the brass helmet worn by Magellan, intrepid 16th century explorer, was found in the Philippines. The Copper and Brass Research Association discovered this fact through its own news-gathering organization, an organization which of course has brass and copper news for its objective. The publication of this information in the Association's Bulletin was the source of much public interest, and wide currency in the press of the country was given to the fact that this historic brass helmet, 402 years old, was still unaffected by the action of time.

When King Tut was a first-page celebrity, this same news-gathering service dug into the musty depths of Egyptian antiquity and showed why King Tut's

middle name actually meant copper. This, too, created wide public interest. This sort of work, carried on consistently, in a way that rigidly observes the difference between that which may be honestly classed as news, in distinction to that which is purely advertising, has been the source of greatly renewed public interest in brass and copper.

An Advertising Program

To demonstrate to the public the superiority of brass and copper for use in industry and the home, advertising in newspapers, popular and technical magazines has been used liberally. A total of 31,505,206 pages of such advertising appeared in 1922, and a corresponding effort is being exerted in 1923. Last year 1,800,000 pieces of printed matter, designed to supplement the influence of the advertising, were distributed by the association. It is interesting to note that more than a million copies of this educational material, comprising pamphlets, inserts to enclose with mail matter, counter displays and posters, were distributed through dealers in brass and copper.

When occasion warrants, the association supplies dealers with specially prepared advertising material, and, in outstanding cases, its field representative sits in with the dealer and advises him concerning the solution of local problems involving the sale of brass and copper.

The second distinct feature of the association's effort is technical and commercial research. Fundamentally, this work has a selfish motive—for its object is, of course, to increase copper and brass consumption. But its method is wholly one of real public service. This research work is, in essence, what might be termed the research of consumption as distinguished from the research of production and manufacturing.

Brass Fabrication

Chemical and metallurgical science of the highest type is utilized in copper and brass fabricating plants to improve processes and products. Research in the Naugatuck Valley and elsewhere is producing brass and copper of a grade and uniformity never before equalled. But what might be termed the research of consumption has been, until recently, an untouched field. New metals and alloys have of necessity had to help the consumer to obtain the best results from the use of their products. Their manufacturers have literally solved the problems of the consumer—in terms of their own metals or alloys.

Copper and brass, naturally endowed with properties which make them superior to the vast majority of these substitute materials, were losing ground through lack of public knowledge of their use. To remedy that situation is one task of the association's research department. In addition, the research work involves the survey of leading industries which consume, or should consume, copper and brass in quantity, and steps are promptly taken to encourage increased consumption wherever opportunity exists. New uses of the metals are also taken up and considered.

Of a number of major research problems being considered at the present time, the following are perhaps typical:

1. The use of copper in locomotives for fire boxes, flues, thermic syphons, etc.;
2. Fatigue tests of copper and copper alloys;
3. Corrosion of brass pipe;
4. Corrosive influences at work in water and soils;
5. Friction factors for various substances coming in contact with copper and copper products;
6. Theoretical and technical aspects of the use of copper for roofing and flashing;
7. Atmospheric corrosion of copper;
8. Use of copper in the field of high tension transmission;
9. Conductivities and other properties of copper and copper alloys;
10. Use of copper and copper base paints to resist the action of marine borers.

The commercial research activities of the association which in themselves are more or less a matter of technical application of copper products cover many industries. Naturally, those industries which offer the greatest consumption of copper and brass are the subject of the greatest effort.

Standardization of Brass

There is another subject which deserves mention because of its economic importance. That is, standardization of copper and brass products. The association is cooperating with the Department of Commerce, with the United States Chamber of Commerce, and of course with its own members in the endeavor to eliminate the manufacture of an excessively large number of different products. Considering the large number of alloys and the variety of products, the undertaking is one of large proportions, but the attitude of brass and copper fabricators on this subject augurs ultimate success for the effort.

Specific problems connected with the application of copper and brass in all fields and industries are constantly engaging the attention of the Copper and Brass Research Association. Many industries through their own associations, and individual manufacturers as well, have availed themselves of this service, and in the majority of cases the association has furnished information which enabled the inquirer to improve his products or method. New or continued uses of copper and brass have thereby been insured in all such cases.

This, in general, is the work of the Copper and Brass Research Association. Through it, the brass and copper industries are effectually winning back uses which were going to other products mainly as a result of a sociological phenomenon which should be the concern of all far-seeing people. The one great indictment which can be made against our age of industrial marvels is that it produces two large a percentage of shoddy along with its really beneficent output. The result is a great drain on the resources of America. But the lane has reached its turning.

Take building construction as a case in point. The Copper and Brass Research Association, before entering the lists to increase the consumption of these metals in building construction, found that metal consumed by rust in American homes alone was costing the public $626,500,000 annually. Here were uses which, in the day of our old friend the Ohio dominie, were entirely filled by copper and brass, but now given over to substitute materials, with the result that where brass and copper served for generations, the substitutes were serving but a few years. The same is true in somewhat the same degree in all other industries. The appeal "it's cheap," in combination with the appeal "it's new," is now being answered with brass-bound, copper-riveted facts to show that the oldest metals, copper, brass and bronze, are, in the long run, the best and cheapest after all.

The task involves what amounts to the creation anew of the lost art of discriminating purchase; but real headway is being made. The increase of copper and brass in building construction has shown particularly gratifying results. For instance, copper today is once more the standard for sheet metal work in this country. Here the tables have already been turned on substitute materials. One moderate sized copper manufacturer is selling monthly a million pounds of copper sheet for leaders and gutters alone. With the other factors supplying the same product, it means that approximately 60,000,000 pounds of copper are being used for this purpose, in a market which never consumed more than 10,000,000 pounds before.

Where, last year, 150,000,000 pounds of copper and brass went into building construction in this country, the total consumption in years of an equivalent amount of building activity would total approximately 600,000,000 pounds, if the public is made fully to understand the superior service and economy of brass and copper. Here alone is a field which, even in years of normal building activity, should become a consumer of brass and copper that in volume will closely crowd the heels of the largest present consumer, the electrical industry.

THE PROSPECTS FOR LEGISLATION ON BUSINESS

By E. H. PULLMAN
Staff of the American Mining Congress

A FLOOD of bills of all sorts of legislative proposals will greet the new Congress when it convenes next December. This will include many proposals which were advanced during the last Congress, but which were not acted upon and which, according to congressional procedure, must be reintroduced in each new Congress in order to receive attention. In addition, a large number of new legislative ideas will be advanced by the more than 100 new members of the House and Senate who will take their seats in Congress for the first time.

The railroad question promises to be the outstanding feature of congressional consideration, and a large number of bills are expected to be introduced on this subject. Measures are being drafted by a group of progressive members of both House and Senate, who recently conferred on the railroad question at Chicago. These proposals will be aimed at the repeal of the present transportation law, particularly directed at the guarantee provision and valuation question.

The Railroad Labor Board is also expected to be the subject of proposed congressional activity, with the promise of bills expected to call for the abolition of this board and the merging of its functions of adjusting railroad labor disputes in the Interstate Commerce Commission.

This same progressive group is also likely to further legislation affecting the natural resources of the country, being aimed more directly toward their conservation and their regulation by the government.

COAL LEGISLATION

The Coal Commission has not yet presented its conclusions as to what legislative remedies are necessary to stabilize the coal industry and to put an end to mine warfare, but it is a certainty that the coal question will be the subject of a large number of measures which will be presented by congressmen with a view of assuring peace in the mining industry, adequate supply of fuel at reasonable prices and general regulation of the coal industry, on behalf of the general welfare, and to put an end to the disturbing conditions which have prevailed since the war.

Should the commission advance certain definite legislative proposals, it is expected they will be adopted as an administrative policy and receive the backing of the President and the majority party in power in Congress, which will go a long way toward enactment of the new legislation. The commission, however, is hopeful that such remedies as may be necessary to stabilize the coal industry and remove the basic cause of friction may be accomplished by mutual agreement of the operators and miners which will do away with the necessity of extensive legislation.

It also believes that many of the possible changes in the functioning of the coal industry can be accomplished through action of the various States.

On the other hand, there is a sentiment among some members of Congress that effective action must be taken by Congress in order to assure stable conditions in the coal industry and these members are expected to advance proposals to meet that end.

GOLD AND SILVER

Gold and silver producers are anticipating constructive legislative recommendations in behalf of this industry from the hands of the special Senate Commission on Gold and Silver. This commission is lending assistance to the gold and silver industry with a view to contributing to the stabilization of currencies and the increased use of these basic metals as their security. The commission has for its goal the ultimate benefit of American miners of precious metals who have suffered losses since the war due to increased cost of mining and excessive cost of other products, and decreased price of silver from $1 per ounce under the Pittman act which had been prevailing for three years.

The commission has taken gold and silver producers into its confidence, receiving their suggestions and endeavoring in every way to produce legislative recommendations which will continue to maintain standards of normal production. This commission is expected to submit its recommendations to Congress in January and they are expected to be pressed for consideration with a view to their early enactment. At this writing, it is not possible to forcast what recommendations the commission may make, but gold and silver producers can be assured that their interests are uppermost in the minds of this commission, all of whom are western men and keenly alive to the situation and needs of the gold and silver industry.

MINE LAW CODE

Revision of the mining laws into a single code, which was proposed during the last Congress, but which failed to emerge from the committee due to lack of unity of the mining industry on certain phases of the revision, is still a matter of uncertainty. Since the House Committee on Mines and Mining, which considered this matter, put aside the measure at the last Congress, there has been no evidence of either a modification of the original mining revision law bill or a definite adhering to the original revision proposal. Should this situation continue, it is not expected the new mining committees of Congress will take a different view of the situation than was taken by the House committee. It is expected, however, that the measure or one of a similar character will be reintroduced to permit further consideration of this matter.

BLUE SKY

Blue sky legislation is also expected to make its reappearance. This legislation was passed by the House but failed in the Senate committee. There is reason to believe that the bill will be as vigorously pressed for enactment in the new Congress as it was in the last.

Legislation affecting mining in Alaska, with a view to its further development, and a more liberal law, will probably result from the visit of President Harding tc Alaska this summer. There has been an insistent demand from both residents of Alaska and government departments administering Alaskan affairs for the liberalization of Alaskan mining laws on the ground that the hardships of pioneers in this new country justify more liberal mining laws than prevail in the States, where the climate and other conditions are more desirable than in the northwestern territory. President Harding went to Alaska for the purpose of investingating this, among other matters, and the policies he developed are to be continued by President Coolidge.

DEPT. OF MINES

Determined efforts will be made in the new Congress by friends of the mining industry to secure for that industry a Department of Mines. This matter is expected to come up in connection with the proposed consolidation of government departments and among the first bills to be introduced will be one by Senator Oddie (Rep.) Nevada, who is expected to be chairman of the Senate Mines and Mining Committee, to create a Department of Mines.

There is some possibility that the tax laws may be amended with a view of reducing the present rates. Officials of the administration have hope that with reduced government expenditures there may be a possibility of cutting tax levies. Whether this can be undertaken at the next session will depend on the state of finances of the government as revealed by the report of the Secretary of the Treasury which will be submitted in December.

STATUS OF NATIONAL LEGISLATION

Bill	Introduced by	Purpose	Committee Reference	Final Action
		MINING		
S. 4040	Oddie, Nev.	Gold Bounty	Mines and Mining	
H. R. 13606	McArthur, Ore.	Mine Assessment Suspension	Mines and Mining	
H. R. 10698	King, Utah	Amendment to Blue Sky Bill	Interstate Commerce	
H. R. 12967	Petersen, N. Y.	Alaskan Minerals	Public Lands	
S. J. Res. 23		Quarry Leasing		Enacted into Law
S. 4197	Harreld, Okla.	Oklahoma Leases		Enacted into Law
H. R. 13932	McClintic, Okla.	Red River Lands	Public Lands	
H. R. 12580	Murphy, Ohio	Oklahoma Claims	Public Lands	
H. R. 13835	Mondell, Wyo.	Lease Royalties	Reported by House Indian Affairs	
H. R. 13777	Leatherwood, Utah	Royalties to Indians	Indian Affairs	
S. J. Res. 267	Harreld, Okla.	Royalties to State	Public Lands	
H. R. 9405		Royalty Fee	Reported by Indian Affairs	
S. 3794		Lease Receipts	Reported by House Public Lands	Passed by Senate
S. Res. 268	Walsh, Mont.	Investigation of Leases	Public Lands	
S. Res. 434	Kendrick, Wyo.	Investigation of Naval Oil Reserves		Adopted by Senate
S. J. Res. 265	Smith, S. C.	Arsenate Purchase	Reported by House Agriculture	Passed by Senate
H. J. Res. 420	Stevenson, S. C.	Arsenate Purchase	Agriculture	
H. Res. 448	Wise, Ga.	Calcium Arsenate	Interstate Commerce	
S. 4402	Harris, Ga.	Free Arsenate	Finance	
H. R. 14110	Almon, Ala.	Free Arsenate	Ways and Means	
H. R. 11549	Kahn, Calif.	Helium Development	Transferred from Public Lands to Military	
S. 4300	King, Utah	Gilsonite	Public Lands	
S. 2460	Smoot, Utah	Utah Lands		Enacted into Law
S. 4243	Bursum, N. M.	Minerals to Germany	Finance	
H. R. 31608	Williams, Ill.	Minerals to Germany	Banking	
H. R. 8010		Indian Lands		Enacted into Law
		SILVER		
S. Res. 469	Walsh, Mont.	Gold and Silver Commission Inquiry		Passed by Senate
H. R. 13194	Lineberger, Calif.	Special Coins	Coinage	
S. Con. Res. 31	Nicholson, Colo.	Increased Coinage	Mines and Mining	
S. 4096	Johnson, Calif.	Special Coins	Banking	
S. Con. Res. 37	Nicholson, Colo.	Gold and Silver Commission Inquiry		Passed by Senate
H. J. Res. 441	Colton, Utah	Gold and Silver Commission Inquiry		Reported by House Mines and Mining
H. Con. Res. 77	Colton, Utah	Increased Coinage	Mines and Mining	
S. 4337	Smoot, Utah	Silver for West	Finance	
S. 4277	King, Utah	Bullion Sale	Banking	
H. R. 13809	Gernerd, Pa.	Special Silver Coinage	Reported by Coinage	
S. 4468	Reed, Pa.	Special Silver Coinage		Enacted into Law
H. R. 13883	Sinclair, N. D.	Coinage for Soldier Bonus	Ways and Means	
		COAL		
H. R. 12377	Winslow, Mass.	Commission Investigation		Enacted into Law
S. 4160	Borah, Idaho	Amending Commission Law		Enacted into Law
H. R. 13294	Winslow, Mass.	Amending Commission Law	Interstate Commerce	
H. R. 12472	Winslow, Mass.	Federal Fuel Distributor		Enacted into Law
H. J. Res. 381	Volstead, Minn.	Regulation by Constitutional Amendment	Judiciary	
S. 4407	Brookhart, Iowa	Government Operation	Labor	
S. 3985	King, Utah	Price Control	Judiciary	
H. R. 12718	McSwain, S. C.	Contract Publicity	Interstate Commerce	
H. R. 14300	McSwain, S. C.	Preferential Shipment	Interstate Commerce	
S. 4447	Walsh, Mass.	Anthracite Standards	Labor	
S. 4649	Walsh, Mass.	Anthracite Standards	Mines and Mining	
S. Res. 452	Walsh, Mass.	Anthracite Standards	Mines and Mining	
S. Res. 418	Walsh, Mass.	Embargo Report by I. C. C.		Passed by Senate
S. 4559	Lodge, Mass.	Export Embargo	Interstate Commerce	
H. R. 14369	Fish, N. Y.	Export Embargo	Interstate Commerce	
H. R. 12826	Rogers, Mass.	Export Embargo	Interstate Commerce	
H. R. 12827	Rogers, Mass.	Anthracite Export Embargo	Interstate Commerce	
H. Res. 473	Brennan, Mich.	Anthracite Export Embargo	Interstate Commerce	
H. R. 14297	Snyder, N. Y.	Anthracite Export Embargo	Interstate Commerce	
H. Con. Res. 79	Appleby, N. J.	Storage Tax	Interstate Commerce	
S. Res. 400	Pomerene, Ohio	Ship Fuel Report		Adopted by Senate
H. R. 13832	Winslow, Mass.	Canal Fuel Plant Sale	Interstate Commerce	

Bill	Introduced by	Purpose	Committee Reference	Final Action
		TAXATION		
H. R. 13775	Green, Iowa	Credits and Refunds		Enacted into Law
H. J. Res. 314	Green, Iowa	Federal and State Securities		Passed by House
H. R. 13770	Mills, N. Y.	Capital Gains and Losses		Passed by House
S. 4547	Brookhart, Iowa	Corporation Taxes	Finance	
H. R. 14223	Frear, Wis.	Corporation Taxes	Ways and Means	
S. 3993	King, Utah	Corporation Taxes	Finance	
H. R. 12825	Jones, Texas	Tax Determination	Ways and Means	
H. R. 13659	Frear, Wis.	Excess Profits	Ways and Means	
H. R. 13740	Tincher, Kans.	Net Loss	Ways and Means	
H. R. 13774		Exchanges of Property		Passed by House
H. R. 11939		Bank Taxes		Enacted into Law
H. R. 13907	Mills, N. Y.	Tax Refund	Ways and Means	
H. R. 13633	Turner, Tenn.	Producers' Exemption	Ways and Means	
S. 3994	King, Utah	Individual Taxes	Finance	
S. 3992	King, Utah	Tax Directory	Finance	
S. Res. 451		Tax Inquiry		Adopted by Senate
H. R. 10193		Indian Taxes		Enacted into Law
		TARIFF		
H. R. 7456	Fordney, Mich.	Revised Rates		Enacted into Law
H. J. Res. 380	Ansorge, N. Y.	Change Rate Making System	Ways and Means	
		INDUSTRY		
H. R. 13091	Frear, Wis.	Monopoly Control	Judiciary	
H. R. 13201	Johnson, S. D.	Resources Control in War	Military	
H. J. Res. 384	Johnson, S. D.	War Conscription	Judiciary	
H. R. 13181	Dickinson, Iowa	Muscle Shoals	Military	
H. J. Res. 383	Hull, Iowa	Muscle Shoals	Military	
H. R. 13293	Winslow, Mass.	Commerce Promotion.	Interstate Commerce	
H. R. 12817	Greene, Mass.	Ship Subsidy.	Merchant Marine	Defeated in Senate
H. R. 12817	King, Utah	Ship Subsidy.	Commerce	
H. R. 12817	McKellar, Tenn.	Ship Subsidy.	Commerce	
H. R. 12817	Kellogg, Minn.	Ship Subsidy.	Commerce	
H. R. 12817	McNary, Oregon	Ship Subsidy.	Commerce	
H. R. 12817	Brookhart, Iowa	Amendment to Ship Subsidy Bill	Commerce	
H. R. 13160	Hawes, Mo.	Regional Commissions	Interstate Commerce	
H. R. 13161	Hawes, Mo.	Regional Commissions	Interstate Commerce	
H. J. Res. 389	Zihlman, Md.	Building Materials	Interstate Commerce	
H. R. 4810	Dyer, Mo.	China Trade		Enacted into Law
S. 2716		Traveling Salesmen		Enacted into Law
		LABOR		
H. R. 12683	Fairchild, N. Y.	National Unions	Labor	
H. R. 12581	Hoch, Kans.	Adjustment Board	Interstate Commerce	
H. R. 12647	Goodykoontz, W. Va.	Labor Board	Interstate Commerce	
H. R. 12650	Cooper, Ohio	Labor Board	Interstate Commerce	
H. R. 12622	Schall, Minn.	Prosecution Exemption	Judiciary	
H. Res. 425	Keller, Minn.	Impeachment of Attorney General	Judiciary	
H. J. Res. 376	Johnson, Wash.	Child Labor	Judiciary	
H. J. Res. 385	Graham, Ill.	Child Labor	Judiciary	
		MISCELLANEOUS		
S. 3962	New, Ind.	Threatening Letters		Passed by Senate
H. R. 13773		Radio Control		Passed by House
S. 4324		Turpentine Producers		Passed by Senate
S. 1076	Harrison, Miss.	Naval Stores Standards		Enacted into Law
H. R. 13950	Fairchild, N. Y.	Bankruptcy	Judiciary	
H. R. 9103	Volstead, Minn.	Additional Judges		Enacted into Law
H. R. 14222		Alien Property Return		Enacted into Law
H. J. Res. 246	Frear, Wis.	Supreme Court Decisions	Judiciary	
H. R. 14209	Woodruff, Mich.	Supreme Court Decisions	Judiciary	
S. 4483	Borah, Idaho	Supreme Court Decisions	Judiciary	
H. R. 13480	Mondell, Wyo.	Colorado River	Irrigation	
H. R. 13344	Dupre, La.	Waterways Commission	Flood Control	
H. R. 12815	Hill, Md.	Soldier Bonus	Ways and Means	
H. R. 12816	Britten, Ill.	Soldier Bonus	Ways and Means	
H. R. 12896	Johnson, S. D.	Soldier Bonus	Ways and Means	
S. 4020	Bursum, N. M.	Soldier Bonus	Military	
H. R. 12830	Madden, Ill.	Claims	Merchant Marine	
S. J. Res. 269	Calder, N. Y.	Railroad Claims	Interstate Commerce	
H. R. 14225	Clarke, N. Y.	Forest Conservation	Agriculture	
S. Res. 398	McNary, Ore.	Forest Investigation		Passed by Senate
S. 4486	Robinson, Ark.	Corporation Liability	Judiciary	
H. R. 14254		Foreign Debt Settlement		Enacted into Law
S. 4497	Smoot, Utah	Foreign Debt Settlement	Finance	
S. 4495	Pepper, Pa.	Steel Company Wages	Claims	

PRACTICAL PROBLEMS IN EXTRACTING OIL FROM SHALE

A Careful Study of the Difficulties Which Must be Overcome When Winning the Oils From a Mass of Other Substances—The Most Promising Methods and Retorts

By Victor C. Alderson

THE production of petroleum at the present time is about 551,197,000 barrels a year and with the estimated reserves of 9,150,000,000 barrels in 1922, this would give a supply lasting only twenty years more, if production could be continued at the present rate. The great demand for petroleum products is due to many factors, chief among these being the demand for motor gasoline for automobiles. The increase in vehicles during the past twelve years has been approximately 3,900 per cent, while the increase in production of gasoline has been 900 per cent. Demands for kerosene have increased greatly within the last few years as a result chiefly of exports and also the increase of farm tractors which utilize kerosene. The demand for gas oil and fuel oil has likewise increased. The automobile industry has not only increased the demand for gasoline but also for lubricants. In 1922, the production of lubricants was 25,860,000 gallons a month. Fuel oil demand has increased, due to the tendency to use oil instead of coal on steamships, railroads, and in power plants. It is therefore evident that the consumption is ahead of production and that within a few years either new sources of petroleum must be found or else substitutes must be used.

Substitutes for Petroleum

Electric power may replace fuel oil in the case of railroads and other industries using steam power which is generated by the use of oil. The by-products from bituminous coal, lignite, cannel coal, and peat may help replace petroleum products to a small extent only, for the yields from the coals are not great enough to entirely supply the demand. Such products as benzol and heavy tar are used for motor fuel by blending with gasoline and as fuel oils, respectively. Alcohol may be used in motors in the place of gasoline. The probable future source of lubricants is doubtful; however, it may be possible to obtain them from shale oil, but as yet this is not certain. As a source of petroleum substitutes, oil shale will probably be the most important. It has been used in Scotland and France for many years and no doubt will be used in the United States in the future.

Problems of the Industry

One of the most important problems is the determination of the best type of material for the construction of the retort, that is, of the refractory parts. Ordinary fire bricks have been used in the case of coke ovens, but the heat conductivity of these is not very high and so other materials have been sought. The possibility of carbonized bricks and silica bricks can be considered for the future. For the metal parts of the retort alloys and protected castings may be used where high temperatures are necessary. Other factors to be considered are the specific gravity, specific heat, heat of conductivity, heat of combustion, and the proximate and ultimate analysis.

Certain factors which effect the quantity and quality of the oil should be studied. These are as follows:

(1) Rate or rise of temperature.

(2) Maximum temperature to which shale is subjected.

(3) Amount and temperature of steam or other gases used.

(4) Size of shale retorted.

(5) Pressure under which the shale is retorted.

(6) Time of contact of the vapors with the walls.

After determining these factors, they must be applied to large scale operation, and they must be used in determining the type of retort which will produce the best and largest amount of oil at a minimum cost. It is necessary to produce as good a quality of oil as possible from the shale, and the temperature, time, type of retort, and kind of shale will all affect the results.

Description of Shale and its Retorting

Oil shale is a compact laminated rock of sedimentary origin yielding over 33 per cent ash and containing organic matter that yields oil when distilled, but not appreciably when treated with solvents. Practically all shales will, however, yield small amounts of hydrocarbons when extracted with solvents. The percentage by weight extracted by the solvents varies from 0.04 per cent to 2.04 per cent, depending upon the shale and solvent. These extracts do not resemble the products of distillation for the shales contain substances classed as pyrobitumens, which, on destructive distillation, yield oils.

The mineral matter of oil shales is largely clay or aluminum silicate, shales from different localities differing in the composition of mineral matter. From the proximate analyses the moisture varies from 0.10 per cent to 8.5 per cent. The volatile hydrocarbons from 15 per cent to 75 per cent and the fixed carbons vary from 0.7 per cent to 31 per cent. The ash from 8 per cent to 77 per cent. Nitrogen varies directly with the oil yield and ranges from 0.15 per cent for a seven gallons per ton yield to 0.96 per cent for a sixty-gallon per ton yield. Oil shales also contain small amounts of pyrite, pyrrhotite, and gypsum, and these minerals contain most of the sulphur found in the shales.

Little information is available on the chemical composition of kerogen, but in Scotland it has been found to consist of 73.05 per cent carbon, 10.62 per cent hydrogen and 16.33 per cent of oxygen. The kerogen in different shales has not the same composition and is probably not of a definite chemical compound in each particular sample of shale.

Distillation of Oil Shale

The kerogen in the oil shale is only slightly soluble in carbon disulphide, and for this reason has been classed as a pyrobitumen. Certain pyrobitumens, on being heated, change into bitumens, becoming soluble in organic solvents. The oil-producing materials of shale are, therefore, considered as asphaltic pyrobitumens and on being heated first change into a bitumen largely soluble in organic solvents and which, after extraction from the shale, is a semi-fluid or asphalt-like substance. The conversion of the pyrobitumen to a bitumen is not clearly understood. It may be due to complete or partial depolymerization. It progresses at a temperature of 400 C. and over, producing gas, oil vapors and fixed carbon. The change of the kerogen into bitumen will take place at much lower temperatures if sufficient time is allowed. There are two steps in the distillation of oil shales: (1) conversion of the kerogen into a bitumen and (2) decomposition of bitumen into gas, oil vapors, and carbon. Both of these steps or stages probably occur at the same time.

The first effect of heat upon the shale is the removal of some of the occluded gases that exist in small quantities. Next, actual decomposition or change of state of the kerogen probably commences wherein a heavy liquid soluble in organic solvents evidently forms. Third, as the heavy liquid forms, it decomposes at a temperature which may be affected to some extent by pressures developed within the shale. Finally, as the vapors are

produced within the pieces of shale, they immediately become subjected to pyrolysis caused by their passing through zones of higher temperatures before they escape from the retort. The vapors are certain to become somewhat superheated because, having low specific heats, they will readily absorb heat from the hotter shale with which they come in contact. The vapors, in passing outwardly from the center of a lump of shale, will move in a direction opposite to the flow of heat, and will obviously become hotter as they pass outwardly through the lump, since the lump is transmitting heat inwardly.

The temperature difference between the outside and inside of the shale lumps becomes increasingly greater as the distillation progresses until a fairly constant difference remains depending upon the rate of rise of temperature and the heat consuming reactions of the shale. It is obvious, then, that there is likely to be a wide range of temperature when heating rapidly, not only within the shale pieces themselves, but also within the shale charge as a whole. Experiments have been performed on shale crushed to pass a quarter-inch mesh and during the time of heating a difference of 200 C. was obtained on the outside and inside of the pieces of shale. Had the lumps been of greater size, the oil vapors liberated at the center on working their way to the surface would have passed through a layer of partially-spent shale and would have been subjected to a temperature as much as 250 C. higher than that at which the vapors were produced. It is, therefore, probable that superheat received by the vapors in penetrating the hot exterior zone will alone greatly decompose them, but there are other factors acting simultaneously to augment the cracking.

Effect of Rate of Heat Supply

If the shale is heated very gradually, the vapors and gases evolve very slowly, and, unless means are provided for scavenging, they will tend to stagnate in the retort, and are thus subject to prolonged pyrolytic effects, which may result in excessive decomposition. It must, therefore, be borne in mind that the vapors are produced by destructive distillation and if distillation is hastened by excessively rapid heating the retort temperatures may be so high that the vapors will be badly decomposed, even though they are removed quickly. It may be expected, therefore, that a retort, whether horizontal, vertical, or inclined, which exposes to the vapors a large excessively heated surface, will, unless it uses an efficient scavenging method, probably produce much gas, much carbon and an inferior grade of oil in small quantities.

Cracking of Heavy Oils

The cracking of a paraffin hydrocarbon might give a lower paraffin or an olefin. The sensitive nature of the paraffins, when subjected to high temperatures, is due to the diminishing supply of hydrogen and a greater supply of carbon. If the portion remaining in the paraffin series comes into contact with a greater amount of hydrogen, it simply discards part of the carbon and takes up more hydrogen, thus building up a higher paraffin compound. The extra carbon cannot build up a higher compound, due to the lack of hydrogen, much less one of the lower series where more hydrogen is required. The carbon, therefore, goes to form an olefin, where one carbon atom exists with only one hydrogen atom. When compounds contain an excess of carbon at high temperatures, the diminishing supply of hydrogen fails to saturate the carbon atom.

It must be remembered that the inorganic material of the shale is a heterogeneous mixture of minerals solidified into a very close grained compact mass. This mineral mass has a thermal conductivity different from that of the kerogen, thus complicating the problem of even distribution of heat. Furthermore, the temperatures of dehydration of gypsum and some of the hydrous silicates are included within the temperature range of distillation of the shale. These minerals are frequently present in the shales, and the evolution of water vapors from them will affect the partial pressures of the hydrocarbon vapors evolved from the kerogen, probably tending toward the improvement of the quality of oil distillates.

At different temperatures and pressure, different products may be obtained and the number varies with the size and complexity of the original molecule. Since the molecules of kerogen are very large and complex, the number of products obtainable from it vary greatly as to the properties.

The oils produced from shales by destructive distillation consist chiefly of a mixture of olefins, paraffin, diolefins and napthalenes and also the benzines. In addition to the oils, consisting of the above mixtures, fixed gases are produced from the shales consisting chiefly of carbon monoxide, carbon dioxide, hydrogen and hydrogen sulphide, and the lower members of the various hydrocarbon series. Since so many different products are obtainable from oil shale, the commercial distillation must be maintained under suitable conditions to obtain the desired quality and quantity of oil. On account of the formation of so many products and the limitations of mechanical control, it is impossible to produce an oil containing only the desired hydrocarbons. The products will contain some of the undesired hydrocarbons and these must be removed by further refining. The products of oil shale are greatly influenced by the retorting conditions.

Another fact to be considered is that on first heating the shale heavy oils are given off instead of light oils, as in the case of petroleum. This heavy product may be decomposed into lighter products by additional heat. In the commercial distillation of oil shale, the highest yield with best quality of oil is the object sought. Through destructive distillation, the organic molecules lose hydrogen and become unsaturated, and these unsaturated hydrocarbons such as the diolefins, olefins and acetylenes are objectionable for commercial use. They tend to oxidize and form gums and resins.

Use of Steam

In comparing oil with water, we note that if a drop of oil and water are placed on a piece of glass the water will dry up soon, while the oil will not, on account of the clinging together of the molecules in the oil. We might, therefore, expect the boiling point to be higher on account of this clinging effect, since the separation of its molecules into the vapor state will be difficult. Therefore any process which will tend to separate the molecules will lower the boiling point. In the case of two non-miscible liquids, such as oil and water, each will vaporize independently of the other, and there will be no coherence of their molecules. The vapor molecules of one occupy the intermolecular spaces of the other, and each contributes to the vapor pressure upon their surface. On boiling the highly expansive molecules of water push the oil molecules apart. This increase of space between the molecules of oil weakens their cohesion and rarifies the vapor mass which lowers the vapor pressure. This in turn lowers the boiling point, which is the desired effect with the use of steam.

Types of Retorts Used

In building retorts in the United States the tendency has been to disregard the Scotch type of retort and to build them of a different type entirely. The objections to the Scotch retort are that its initial cost is high and that it is designed to produce a maximum amount of ammonia and will not treat United States shales satisfactorily. The capacity of the Scotch retort is low, but, on the other hand, slow-heating and low yields produce good qualities of oil which may be more economical in the long run. The vertical type of retort is much more economical in the handling of the shale, since it may be transferred by gravity, thus doing away with mechanical devices. Other objections to the Scotch retort are the immense condensing surfaces neces-

sary for the use of steam and the fact that the United States shales do not contain sufficient amounts of nitrogen to warrant the production of ammonium sulphate. The coking of shales on the walls of the retort may also be avoided by slow heating and the use of steam, which will remove the products rapidly.

AMERICAN RETORTS

1. *Horizontal with conveyor systems for moving shale through the retort.*—(a) Cylindrical. In this type one or more horizontal cylinders are usually provided with screw conveyors. The shale is fed at one end and passes through the cylinders, being subjected to various degrees of temperature throughout the run.

(b) Rectangular.—This consists of a flat hearth heated from below and covered with hood, which leads the vapors to the mains. Shale is fed to the hearth by a screw conveyor, and the temperature increases from the feed end to the outlet end.

2. *Inclined retorts with conveyors or agitators.*—The retort is inclined at various angles with the horizontal ranging from 5 to 45 degrees. The cross section may be either circular or rectangular. Agitators are provided to keep the shale in motion and to discharge it by continually scraping the bottom of the retort.

3. Continuous externally heated vertical retorts.

(a) One type has two separate chambers, the upper one being heated by passing the exhausted gases through the retort from below. In the upper chamber the shale is heated and dehydrated by contact with hot gases of combustion. The shale is then dropped into the lower part, where destructive distillation takes place. Steam is admittted into the lower chamber.

(b) This is of the continuous operating type, consisting of two separate cylinders, one rotating while the other remains stationary. The cylinders are provided with lugs on the two surfaces rubbing each other and these provide a means of transporting the shale through the retort. Other vertical types operate by using a series of plows rotated on a vertical shaft, which moves the shale through the retort, allowing it to fall from one hearth to another until it is finally discharged.

4. Intermittent, externally heated vertical retorts. This type consists of a vertical retort with both ends tightly closed. It has a pipe running to within a few inches of the lid. This pipe is perforated and the vapors from the shale are drawn in by a suction pump. This system provides better transmission of heat and removal of products.

5. Internally heated retorts. Most of these are of the vertical type. Heating iz effected by passing superheated steam into one end and out the other. The condensible products are removed and the gases heated and passed through the retort again.

6. Horizontal or inclined, rotary cylindrical. This type operates continuously and consists of either a horizontal cylinder or a cylindrical retort inclined at about 15 degrees to the horizontal. The retort is set in a furnace and rotated by gears driven by electric motors or steam engines. Shale is fed at the cooler higher end and passes downward through the retort, sometimes supplemented by spiral baffle plates, causing the shale to move at a uniform rate.

Other types are the vertical externally heated retorts with screw conveyors for moving the shale through the retort, the closed oven type, and the cylindrical retorts externally heated and given an oscillating motion.

CALIFORNIA METAL AND MINERAL PRODUCERS' ASSOCIATION

ROBERT I. KERR

Secretary, California Chapter of the American Mining Congress

THE metalliferous mining industry in California has shown some improvement during the past year, due to renewed activity in the development of gold-bearing areas. Preparations for the early resumption of operations in copper production indicate still further improvement.

Gold production in 1922 is estimated at $14,900,000, approximately $800,000 less than the 1921 production, due, in part, to the closing down of two large producers on account of a mine fire.

Silver also shows a decreased production of approximately $429,000 in value. Copper production increased from 11,743,404 pounds to 22,883,987 pounds, or nearly 100 percent. Lead and zinc production also show material increases in both quantity and value. Curtailment in silver production, as a result of the resumption of open market prices, is expected in some districts. Production will, however, be maintained as a result of the opening of the copper mines.

Mining of all classes has been seriously handicapped during the present year because of the lack of efficient labor. Recent reports indicate a turnover in some section of from 57 to 70 percent.

The activities of this association during the past year has been confined principally to matters wherein the industry has been placed on the defensive. Threatened drastic legislation and regulation, proposed as the result of a mine fire and loss of life in one of the large mines of the State, called for a statewide educational publicity campaign, which was initiated in January and continued during the 1923 session of the legislature. As a result of several conferences with the Department of Safety of the State Industrial Accident Commission, a code of regulations, entitled, "Mine Fire Control Safety Orders," was finally adopted and made effective March 15, 1923.

Legislation proposed at the 45th session of the Legislature which convened in January, providing for the regulation of the gold-dredging industry, and for drastic amendments to the Workmen's Compensation, Insurance and Safety Act, was opposed and finally defeated. Amendments providing for a further reduction in the daily eight-hour working period were also defeated.

In matters of national legislation, the association has received the support and cooperation of The American Mining Congress.

The annual conference of the Western Division of The American Mining Congress was held in San Francisco June 11 and 12, 1923. Resolutions expressing the attitude of western metal mine operators on issues with which they are confronted were adopted and presented for consideration at the annual meeting of the parent organization to be held in Milwaukee September 24-29, 1923.

OIL SHALE NOTES

Report comes of a new and "secret" process by Dr. Hermann Wolf, a German chemist, called the Mutol process. It is claimed that by this process the cost of gasoline will be cut in half, that the yield of oil from shale will be increased from 30 to 65 percent, that "cracking" and high temperature will be dispensed with. The process is described as a "speeding up of nature's method in creating petroleum deposits."

Three stages are noticeable in the matter of a resurvey by the Government of townships at DeBeque. The first stage of joy when announcement was made that a new survey was ordered; second, a stage of depression, when it was learned that the new survey would show such variation from the original as to cause confusion, and questionable title; third, a ruling of the department protecting the holders in their title to land as originally filed on without additional expense.

NOTES OF INTEREST ABOUT OIL SHALE

The Fourth National Oil Shale Conference will be held in connection with the meeting of the American Mining Congress in Milwaukee, September 24-29. There will be addresses by the leading oil shale experts, reports of standing committees, and a general discussion. Dr. Victor C. Alderson, chairman of the oil shale section of the Congress, will preside.

The oil shale deposits at Kinnekulle and Narke are estimated to contain at least 2,000 tons of oil shale, much of which can be mined by open cut methods at a cost of not more than 25 cents a ton. During the past year Messrs. Bergh and Larson have been experimenting on a new retort, erected at the Klara gas works, Stockholm. The reports indicate that the work has been successful and that a commercial plant is now being erected at Kinnekulle. On account of the lack of well oil in Sweden and the high cost of imported oil, the Swedish Government is supplying the funds for developing the oil shale deposits and thus make Sweden independent of crude, imported oil.

At the annual meeting of English Oil Fields, Lt., the chairman of the board stated that about twenty retorts had been tested, but that as yet no one had proved satisfactory. Also that no economical method of desulphurizing the oil had been found. He advised seeking a use for shale oil wherein the sulphur would not be a detriment.

Since the sixteenth century the Tyrolese peasants have been known to distil, in crude iron kettles over a wood fire, the local shale, rich in fossil fish, and to obtain a tarry oil which they used to cure sores and wounds on livestock. These curative effects were due to the antiseptic ichthyol derived from the oil shale, probably because of the excess of the fish remains in the shale. For this reason, Prof. Schroater, of Hamburg, in 1890 gave the name "ichthyol" to the product. By "ichthyol" is meant, in general, a water-soluble oil which is obtained by the distillation of bituminous shale, and subsequently sulphonation and neutralization with ammonia or soda. The ichthyol shale deposits of Germany, Switzerland and Italy should be regarded as a special type of oil shale deposits, not known elsewhere, and not to be compared with the great deposits of Esthonia and the United States. They are found in thin beds, measured in inches rather than in feet, are rich in fossil fish remains, and are chiefly valuable for the ichthyol which may be derived from the crude oil.

Prof. John R. Reeves, of the Indiana University, estimates that the easily recovered oil shale of that state amounts to 45,000,000,000 tons with more that can be mined by underground methods. The advantage of the Indiana over other oil shales lies in the very low cost of mining; that is, from eight to ten tons of Indiana shale can be mined by efficient methods at no greater cost than mining one ton by underground methods.

A deposit of oil shale is reported at McKittrick, forty miles west of Bakersfield, Calif. The depth is unknown, but samples to the depth of 14 feet gave yields from 30 to 95 gallons to the ton, with an average of 60 gallons.

Oil shale retorting in England is receiving marked attention. Besides those still in the blue print stage, the following are being actively exploited; viz, the L. M. N. or Nielsen process, the Plansen, Turner, Lamplough - Harper, Fusion, White, Freeman, Ironside, and the Hampton-Ryan.

REVERSIBLE MINE FANS

(*Concluded from page* 321)

ticular case the reversal of the air currents might prove an advantage. However, many companies take the precaution of providing iron doors, or plates, which fit over the collars of their shafts. These are kept in a convenient place, close to the shaft, and can quickly be put in place. When closed they effectively prevent cinders and burning wood from dropping down and setting fire to the shaft timbers.

Conclusions

The vital problem connected with the saving of life at time of mine fires, and, incidentally, the saving of property, is the prompt control of air currents.

Improvements in mechanical ventilation, while greatly improving underground working conditions, have also increased the fire hazard, due to the use of high-velocity ventilating currents.

It is most important, therefore, to arrive at some satisfactory method of controlling these rapid air currents, and preventing the smoke and gas produced by a fire from reaching the men underground who are endeavoring to escape from the mine.

Two methods of accomplishing this purpose are in present use.

One—the installation of reversing equipment, which, if promptly put into effect, reverses the air currents and forces the smoke and gas-laden air in the opposite direction to that in which it is accustomed to travel.

The other—is by the use of well constructed, mechanically operated doors, placed at all intakes and outlets, to cut off the flow of air, and also at advantageous points throughout a mine, to isolate certain sections, thus bringing the ventilating currents to a standstill.

It should be thoroughly understood that either method, to be effective, must control and check the gas and smoke-laden air currents before they reach the men.

It has been stated in the paper under discussion that reversal of air currents may be accomplished promptly, "in a few minutes, or within an hour."

It has also been demonstrated by companies who have installed mechanically controlled fire doors, and who have instituted daily tests, that such doors can be completely closed within *four seconds* after pressing the button operating the mechanical control.

In the paper under discussion, it is acknowledged that "reversal of air currents is hazardous," and that misuse of the reversing equipment may be attended by disastrous consequences. Also, that technical knowledge and experience as a requisite before authority to "reverse the air currents" can be vested in anyone, and that such authority usually rests with some high officials.

Use and experience have demonstrated that no such strictures need accompany the use of fire doors. Anyone, from the shoveler up, may have permission to close them, in case of an emergency, and, if they are closed by mistake, no harm results. This eliminates the long delays frequently occasioned through having to obtain permission to reverse air currents from some official who temporarily cannot be located.

It would, therefore, appear that the installation and use of efficient and well-constructed doors, mechanically controlled, is the *promptest, most efficient*, and safest method of controlling swift air currents at time of mine fires.

Since there are no attendant hazards connected with the operation of such doors, and it is being demonstrated daily that they can be closed in *far less time than that required to reverse air currents*, it would appear that their use should be made of primary importance in connection with the saving of life and property, while the installation of reversing equipment may be considered of secondary importance and left entirely to the option of the management.

THE COPPER SITUATION

STEPHEN BIRCH,
President Kennecott Copper Corporation.

AFTER A PERIOD of great activity in the metal markets, beginning with November and running well through March last there followed a period of relative inactivity. The buying movement was of large proportions through most of five months, with consumption greatly in excess of production, large reduction in stocks and naturally a material advance in price. Reversal of market conditions has in the intervening five months brought the price down to below that of last October and the upward swing due to the inactive demand has been more than wiped out.

Tht stock of refined metal has been reduced every month, excepting December of last year and July of this year, for the past 27 months, the reduction in that period aggregating 545,000,000 pounds, in addition to which there has been a large absorption of war and other scrap, practically all of it having gone into the melting pot. The stock is now slightly in excess of one month's consumption in face of an increase in production for the same period from 75,000,000 to 185,000,000 pounds per month.

Stephen Birch

As to consumption; the domestic market has taken so far this year an average of 128,000,000 pounds; the foreign markets an average of over 61,000,000 pounds per month.

The takings of the world in American copper have doubled since the stock here was at its peak in April, 1921.

Production at the mines as well as consumption at the mills, in this country has been limited only by labor supply. Most of the American mills are booked to capacity two months ahead. The foreign mills are not nearly so well booked, particularly those in Germany, and it would appear that considerable business is now coming to the home mills, which in years past has been supplied by the foreigners. Continued unsettlement of the European markets with consequent continuous and panicky decline in German and to a lesser extent in French and Belgian exchange would seem to account for a large falling off in the foreign demand by contrast with the very large increase in domestic demand — yet, strange as it may seem, the average of exports for the first seven months of last year was only 62,000,000 pounds, showing the falling off to have been less than 1,000,000 pounds per month.

The United States mines are now producing about 56 percent, the refineries here and in Chile about 82 percent of the world's supply of copper.

As to the future of copper, more and more as demands upon labor increase devices are being invented to overcome the consequent shortage. Compare the electrical devices today with what they were twenty years ago: houses are being outfitted from top to bottom with all sorts of labor-saving devices which require copper in some form or other. People are commencing to understand that there is more economy in the use of substantial materials rather than cheap substitutes. There has been more copper used in the last year for piping, gutters, flashing, leaders and roofing in building construction, both residential and commercial, and particularly in small dwellings, than ever before in the history of the metal. The growth of the automobile industry and the expansion of telephone and telegraph systems, as well as radio, have had and will continue to have a marked effect on the consumption of copper.

Naturally, as the use of electricity expands the use of copper follows. The investigations being made by a number of the states and by the Federal Government itself in power development tend to show the drift and the necessity for the use of hydro-electric power, particularly as the increased cost of fuel and labor are such as to make it imperative. While the economic decay of Germany is having its effect on all the world's markets, creating as it does a lack of confidence in the future and a marked degree of caution in all new enterprises, the demand for electric power is good all over the world. Coal is so costly and difficult to get that the electrification of railroads in Europe is being actively pushed with more actual work being done and in prospect of being done in the near future than ever before. The indications are that every source of water power in Europe and this country, and to a certain extent in South America, South Africa, and the Far East, if within reach of a market for the power, will be developed before very long.

	1921	1922	1923 (7 Months)
The average monthly exports in pounds have been	50,740,670	54,388,912	61,180,499
Domestic demand has been	54,524,512	91,980,364	128,282,857

CALVIN COOLIDGE

A MAN who has known Calvin Coolidge intimately since he was a member of the State Legislature of Massachusetts says, concerning the President's attitude toward public life:

"He does not have his ear to the ground to see what this particular group or that particular group of people are going to think of his decisions.

"When certain political advisors told him that his stand on the Boston police strike would mean his defeat for the governorship, he replied:

" 'It is not at all important whether I am re-elected Governor of Massachusetts—it is of great importance that this issue be correctly determined.'

"When he was signing the official orders on which his stand was based, these same advisors said to him:

" 'Governor, this will make you a lot of enemies.'

"Without raising his eyes from the document, and without halting his pen in its signature, he replied, in his matter of fact way:

" 'I presume it will.' "

The increasing confidence in the probable strength of his administration which is evidencing itself throughout the country is apparently well justified by the man who is inspiring it.

CONVENTION OF AMERICAN MINING CONGRESS

(*Concluded from page* 297)

is studying the silver problem and that there will also be addresses by F. H. Brownell on a Silver Export Association and by a representative western metal mining man on the question of selective immigration and the problem of the labor shortage in western mining camps.

In this connection there will also be interesting group conferences devoted to oil shale and to the problems of the gold and silver producers.

National Standardization Conference.

The Fourth National Standardization Conference will be held in Milwaukee and the entire day of Thursday, September 27, will be devoted to a discussion of the work of the Standardization Division of the American Mining Congress. Speeches will be made by Warren R. Roberts, Charles A. Mitke, A. W. Whitney and other notable mining engineers.

The work of the Standardization Division of the American Mining Congress is of great practical value to all operating men and the Standardization Conferences in Milwaukee will be especially interesting and significant.

National Tax Conference.

The National Tax Conferences of the annual conventions of the American Mining Congress have become one of the most constructive and interesting permanent divisions of the convention work.

This will be particularly true of the tax conferences in Milwaukee as there will be an unusually representative body of men gathered together at this time and some extremely notable addresses.

Wednesday afternoon, September 26, 2 p. m.; Thursday afternoon, September 27, 2 p. m.; Friday afternoon, September 28, 2 p. m., will be devoted to the National Tax Conferences of the American Mining Congress. The speeches will include addresses by Paul Armitage, of New York City; Arnold R. Baar, of Chicago and Geo. E. Holmes, of New York City. H. B. Fernald, of New York City; Wade Kurtz, of Joplin, Mo.; Geo. E. H. Goodner, of Washington, D. C.; Walter A. Staub, of New York City, and W. I. Kircaldie, of Milwaukee, Wis.

Open Forum Discussion of Equipment Problems.

A new feature has been added to the general convention program in Milwaukee which should be of particular interest to the operating man in mining enterprises, in charge of and responsible for different phases of mine equipment. These Open Forum Discussions will be informal in character and will be based on questions submitted by practical operating men.

The chairman presiding at the various Open Forum discussions will be the well-known engineering editors of national trade publications devoted to the mining industry and will include such men as Chas. F. Willis, Arizona Mining Journal; R. Dawson Hall, engineering editor, Coal Age; D. E. A. Charlton, Engineering & Mining Journal Press; N. S. Greensfelder, editor of Explosives Engineer and others.

The Open Forum discussions will be inaugurated at 1:30 p. m. on Tuesday, September 25, and the Tuesday afternoon discussions will include rock drills, mine transportation in all its phases—including the use of mine cars, various types of mine locomotives, the proper type of lubricants and the whole question of roller bearings and plain bearing in mine car designs. Tuesday afternoon will also see a most interesting discussion of the use of underground loading and also shoveling machines as well as a session devoted to the use of safety appliances in gaseous mines.

Wednesday, September 26, 2 p. m.

The Open Forum discussion of equipment problems will be continued which will include a survey of power transmission; the use of underground power and electrical equipment; the use of hoists and hoisting equipment; ventilation in mines and a number of other phases of mine equipment.

Oil Shale Conference.

National oil shale conferences will be held under the direction of Victor C. Alderson, president of the Colorado School of Mines, on Thursday and Friday afternoons.

Annual Banquet.

The annual banquet of the American Mining Congress will take place at the Hotel Wisconsin, 7:30 p. m., Friday evening. Speeches will include Irving L. Lenroot, Senator from Wisconsin; Hon. Hubert Work, Secretary of the Interior; W. H. Finley, president of the Chicago & North Western Railroad.

THE ISSUE IN COAL

(*Concluded from page* 294)

This issue has now been raised in the anthracite industry. In 1902, the anthracite operators were pilloried for their refusal to submit to arbitration the issues with the mine workers' organization. The whole force of public opinion was led by the Government itself in an assault on that position. Today the positions are reversed. The anthracite operators offer to submit all demands of the combination of labor to impartial decision.

But the issue thus raised, the point as to whether a combination of labor shall, in the event of differences with its employers, bludgeon them into submission by the strike to enforce demands which the employers are willing to submit to impartial decision, has been largely ignored.

It is not an issue of the right of an individual man to work; it is not the issue of the right of an individual employer to operate or not to operate; it is the issue of whether as a condition of the creation of great artificial power by combination, these combinations must not lay aside the club of industrial destruction. Never has the issue been more clearly drawn.

President Roosevelt, in 1902, led the fight which once and for all settled that question for combinations of capital. There is an opportunity now to lead public opinion into a settlement of it once and for all as far as powerful and arbitrary combinations of labor are concerned.

At the annual meeting of the Scottish Oils, Ltd., held in Glasgow, after allowance for depreciation, the yearly profit of $935,000 was reported. A regular dividend of 7 percent and an extra of the same amount were declared in the preferred stock, leaving a balance of $35,000 in the treasury for the coming year. The costs of production were reported to be lower than during the previous year, but the selling prices of their products was also reduced. However, the total result was not unsatisfactory in the light of general trade depression in England and Scotland.

The announcement by Robert T. Birls, F. G. S., of London, that he had perfected a commercial method of desulphurizing oil shale, at least of reducing the amount of sulphur to a negligible quantity, brings into prominence the oil shales of Dorset, England. These shales yield from 30 to 40 gallons of oil to the ton, are close to rail and water and lie near the surface so as to be cheaply mined. A company—the Kimmeridge Shale and Oil Company, Ltd.—has been formed to develop the property. This bed is known in England as the Kimmeridge shales. From this shale the first currency in England was made and called "coal money." The deposit has been known for centuries, but it could not be worked successfully on account of the excess of sulphur.

The manufacture of carbon black from oil shale is receiving serious attention. Hitherto carbon black has been produced by burning natural gas, but the supply of natural gas is diminishing. The annual production of carbon black is approximately fifty millions pounds, and varies from 8 to 40 cents a pound.

THE STANDARDIZATION OF MINING AND LOADING EQUIPMENT

An Operator's Point of View—A Plant Can't Be Kept Cheaply in Steady Operation Unless Repair Parts Can Be Had Quickly and Can Be Ordered By Short Telegram

By F. W. Whiteside

"More and more is modern industry recognizing the value of standards. These contribute to simplifying the problems of production, make for uniform and higher quality, and result in economies for producer and consumer alike."
—The Portland Cement Association.

WHEN one first thinks of establishing standards governing mining and loading equipment which will be applicable to a number of mining operations — each a separate problem in itself—the task seems to present so many sides, angles and obstacles as to be impossible of a satisfactory solution.

And while the problem of standardization as applied to coal mining may not be completely solved, it is possible of such illuminating analysis as to be of almost as great value as the finished solution.

Think of what standardization of railroad equipment has accomplished, standard gauge tracks, standardized rolling stock, standardized coupling, switching, braking, heating, lighting and signalling equipment.

It might be said that on account of the constant interchange of railroad haulage equipment standardization is more necessary with railroads than with coal mining companies. Perhaps this is true to a certain extent, yet who will deny the many advantages a single operating mining company enjoys when its equipment is designed to conform to certain specifications and to certain standards?

The writer has in mind a coal washery constructed a number of years ago in Southern Colorado, which, while perhaps an extreme case may serve as an illustration. When the plant was designed a certain weight and style of conveyor chain was specified, a certain weight and style of drive chain was installed. As nearly as possible head shafting, bearings and sprockets were respectively alike even if some were disproportionately over-strength. Foot shafts, bearings and drums were severally alike. In fact, conservative engineering design was cast to the winds and the first cost rather heavily increased. However, when it came to operating the plant, the stock of supplies and renewals was so greatly reduced that the operators felt that standardization in this instance, at least, was a decided success.

Opposed to the above case is another washery, also in Southern Colorado, which was designed by a prominent firm of eastern engineers. It was, in fact, very well designed. Every conveyor with its particular function and load was designed with apparently an ample factor of safety, so that hardly two units contained shafting chains, sprockets or bearings, respectively, alike. Besides which there was similar machinery installed which was purchased from four different manufacturers.

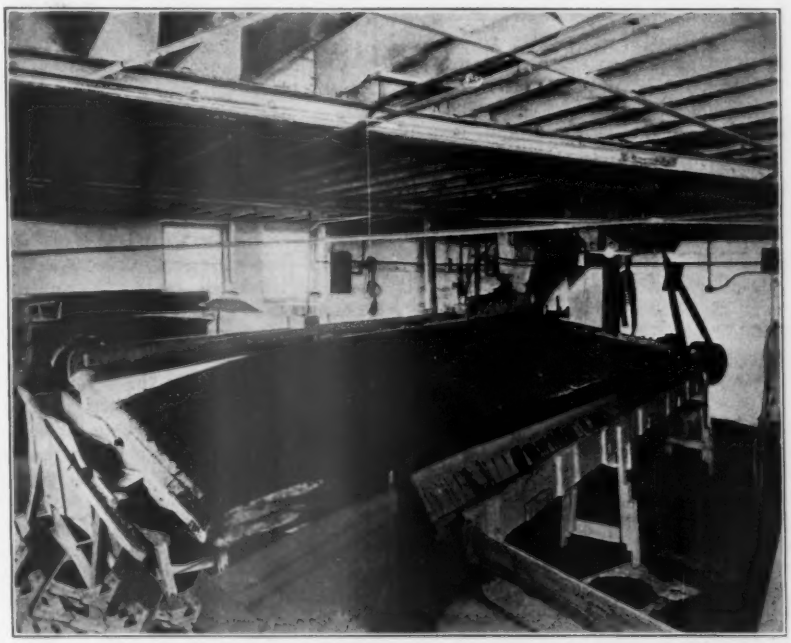
After the plant was put in operation, breakdowns and failures began to occur occasionally, as they will in any washery. A wire would come into the general office for a new part without mention being made of the manufacturer. Perhaps the particular installation for which it was desired was not designated or certain important measurements omitted resulting often in a heavy exchange of telegrams, needless delays and occasional errors. Had a system of standardization, somewhat similar or along the line of that mentioned in the first case been inaugurated much of the trouble and inconvenience would have been eliminated.

The foregoing examples have nothing in common with haulage and loading equipment, but are given to drive home the principle that if standardization is possible in a complex machine like a washery, there should be even greater possibilities in more simple operations, such as haulage and loading.

Such things as standard pit car track gauge, standard wheel base, standard axles for given loads, are each practical and advisable.

It would be good practice to establish standard minimum radii of curves for room turnouts, for parting turnouts and for main line haulage. A standard minimum weight of rail for certain loads with standard tie spacing would have many advantages and would serve to prevent many derailments.

Mechanical loading equipment has been making magnificent strides in the past few years. In the writer's opinion, some time still must elapse before scientific and efficient standardization on any considerable scale is possible. The mining machine and the electric haulage locomotive have been passing through the stages of development until all makes have many things of design in common. Standardization if not actually here is but a few steps ahead.



One section of a modern coal washery

MID-YEAR REVIEW OF METAL MINING

METAL MINING IN ARIZONA IN 1923

THE output of the mines in Arizona was increasing at an unusually rapid rate during the first six months of 1923, according to a statement issued by the Department of the Interior, based on statistics collected by V. C. Heikes of the Geological Survey. The value of the metal output in 1922 was $62,902,725, or more than double that in 1921, but the output of copper was still far below normal, as many of the large companies were idle part of the year. In the first half of 1923, however, most of the large producers had returned to an average output through the stimulus of high prices for the metal.

The value of the output of gold in Arizona in 1922 was $3,524,134, as compared with $2,930,303 in 1921. In 1922 the gold obtained from copper ore was valued at $1,193,696, and the San Francisco (Oatman) district produced $2,085,018, or 59 percent of the total output of gold in the state. With the resumption of activities at the copper mines gold from that source will doubtless increase in 1923, and operations at Oatman suggest a possible increase from gold ore. A new body of ore was opened at the Tom Reed mine, gold ore was reported in the United Verde Extension mine, and operations were resumed at the Gold Roads mine at Oatman. The largest producers of gold in 1922 were the United Eastern, Calumet & Arizona, Tom Reed, United Verde and Copper Queen mines.

The output of silver in 1922 was 4,531,864 ounces, valued at $1 an ounce, an increase from 2,469,394 ounces in 1921. In the early part of 1923 every effort was made to market as much silver ore as possible before the expiration of the Pittman act. The mines at Tombstone were unusually busy, and the production of silver from copper bullion will certainly be greater in 1923 than in 1922 on account of the increases from the Copper Queen, United Verde, Magma, and mines at Clifton and Morenci. Silver ore was being shipped from the Ash Peak district of Greenlee County, a new cyanidation plant was active at the Stargo mine near Morenci, a cyanide mill was operating on the Bonanza property at Tombstone, and a regular production of copper ore containing silver came from the Sheldon mine, in the Walker district, Yavapai County. The change in the price of silver will not seriously affect mining in Arizona, except in a few places because the value of the silver is a very small part of the value of the total mine output.

The output of copper in 1922 was 400,043,128 pounds, valued at $54,005,822, an increase from 185,034,194 pounds in 1921. The average production of copper in Arizona in the last ten years has been more than 500,000,000 pounds, and in 1916, 1917, and 1918 the annual output was more than 700,000,000 pounds. If the present rate of production and price of the metal continue the output in 1923 will certainly be greater than in 1922. Marked increases have been noted from the Copper Queen, United Verde, Morenci mines, Shattuck, Inspiration, Old Dominion, Miami, Ray Consolidated, Magma, Midland, El Tiro, United Verde Extension, Iron Cap, Arizona Commercial, Superior & Boston, and Arizona Binghampton mines. Smelting at Clifton was resumed in May, and construction work on the new Magma smelter at Superior was begun. Improvements are being made at the Calumet & Arizona smelting plant, the new concentration mills for the Copper Queen property was completed, and construction of a new mill for the New Cornelia mine was begun.

The output of lead in 1922 was 15,070,894 pounds, an increase from 6,541,433 pounds in 1921. The price of lead increased from 5.5 cents a pound in 1922 to more than 8 cents in March, 1923. Lead ore is still being shipped from the Copper Queen and Tombstone mines as in 1922, and shipments are also being made from the Shattuck, Calumet & Arizona, and smaller mines. In March the production of both lead ore and copper ore was resumed at the Shattuck mine. After litigation the Seventy-Nine mine, in the Banner district, Gila County, a large producer of lead ore in 1922, was returned to the Continental Commission Co.

The output of zinc in 1922 was 210,624 pounds. In 1923 shipments from the Copper Queen mine have been increased, and the price of more than 7 cents a pound may induce other companies to ship zinc ore later in the year.

Dividends were paid during the first five months of 1923 by the Phelps Dodge, New Cornelia, Miami, United Verde Extension, United Eastern, Calumet & Arizona, United Verde, Inspiration and Iron Cap companies.

METAL MINING IN COLORADO

GOLD was the lure that brought the first permanent settlement in Colorado in 1858-59, according to a statement given out at the Department of the Interior, through Charles W. Henderson, of the Geological Survey. Pikes Peak was the landmark toward which the pioneers headed, and Cherry Creek, in whose gravels, nine years before, gold in small quantities had been found, was the most prominent local destination. A few log houses at the junction of Cherry Creek and Platte River served as a nucleus for the beginning of the city of Denver. Small quantities of gold found on Clear Creek between Platte River and the present site of Golden led the prospecters beyond into the area where now stand the towns of Idaho Springs, Black Hawk, and Central City. The Rocky Mountain Range from Longs Peak to a point below Pikes Peak was penetrated by a veritable army of men in skirmish line. Boulder, Golden, Colorado City and Canon City, which are closer to the mountains than Denver, for a time threatened to make Denver merely a stopping place to the settlements in the mountains, some of which were larger than any of the plains towns. Idaho Springs, Black Hawk, Central City, Georgetown, Tarryall, Fairplay, Granite, Oro (forerunner of Leadville) and Breckenridge became thriving settlements. The semi-aridity of the plains (a condition now almost forgotten in the changes brought about by irrigation) limited the development of farming to the small but fertile benches of soil along the streams in the mountains. The grass of the mountains and mountain parks provided food for cattle that supplied meat and dairy products and for the mine saddle horses and teams.

For ten years gold was the principal metal sought. Then the ores of the Georgetown-Montezuma area made the miners pay attention to silver. In 1877 the silver-lead ores of Leadville were first recognized. For some time silver played so large a part in the destinies of Colorado that from 1892 to 1896 the majority of Coloradoans felt that the very existence of the State depended upon the price of silver. But in the midst of their anxiety the discovery of gold in the lode mines of Cripple Creek and in the lode mines at Leadville turned the attention of the State back to its first product. In 1900 the State produced its greatest output of gold, nearly $29,000,000.

As early as 1885, attention was paid to saving zinc, which was considered the curse of all ores. By 1902 hitherto worthless zinc concentrates had found a market in Belgium. After 1910, the discovery of zinc carbonate ores at Leadville lying there undeveloped, though blocked out by earlier exploration, and the mining of lead-silver bodies made gold and zinc the two most important products of Colorado mines.

Smelting was at first done with charcoal made of wood from Colorado forests, but attention was soon directed to the coal beds. These beds, now known to be enormous, include lignite, semi-bituminous, bituminous and anthracite coals. Much of the coal was found to make excellent coke. Hydraulic mining developed the wood-stave pipe, afterward used in

irrigation projects on the plains. Hydraulic mining also developed the Pelton water wheel, which made possible the development of hydro-electric power. The milling of the ores demanded classifiers, dewaterers, agitators and filters, all of which later found their way into the chemical industry, sewage plants and sugar factories. Money from mines gambled on the feasibility of taking sugar from sugar beets, grown on irrigated lands.

Denver grew from the money and population of Central City, Black Hawk, Idaho Springs, Georgetown, Caribou, Silver Plume, Leadville, Summitville, Creede, Silverton and Telluride. Colorado Springs was founded two or three miles east of the pioneer town of Colorado City, at the foot of Pikes Peak. Cripple Creek gold helped to build office buildings and hotels at Colorado Springs. Although all Colorado mining towns contained substantial homes, hardly a monument in the form of buildings was erected except libraries, schools and county and Federal buildings. To this day the schools of every mining town are the most substantial buildings in the towns and the curriculum is the equal of schools anywhere. It is said that Colorado mines built large buildings in Chicago and New York. The Colorado Building and the Wyoming Building in Washington, D. C., were built with Colorado gold.

Pueblo, at first an Indian village and trading post, grew to be a manufacturing center on Colorado coal and limestone, where were smelted the gold, silver, lead, copper, zinc, iron and manganese ores of Colorado supplemented by iron and manganese ores of Wyoming and New Mexico.

After sixty-four years of continuous mining, with varying degrees of prosperity, the year 1921 witnessed the lowest gross output since 1879. Increased prices for zinc and lead in the last few months of 1922 helped the mines to make a modest recovery, and the production and development during the first six months promises a very considerable increase in 1923. By June, the Leadville smelter was operating four furnaces and was treating more material than it had for twelve years, and the Durango smelter was operating two furnaces as against only one for many years.

The early months of 1923 showed the zinc industry of the State approaching the condition of the more prosperous years from 1912 to 1918. Some of the mines that had been developing during the period of low zinc prices, from 1919 to 1922, were able to respond quickly to the increased price of zinc. The Eagle mines at Red Cliff, the Sunnyside at Eureka and the Wellington at Breckenridge were steady shippers during 1923. The large zinc oxide plant of the Empire Zinc Company, at Canon City, was steadily operated, the Western zinc oxide plant at Leadville was active and the River fuming and matting plant at Florence renewed operations. By June, the Coolbaugh sulphating plant at Durango was working normally in removing zinc from the complex concentrates at the Black Bear mine (San Miguel County), and the large ore bodies blocked out in that mine, together with the fireproof Smuggler Union flotation mill, which is ready to handle the ore, will add large new production to Colorado mines.

The Rawley mill was ready in June to commence operations, and sufficient ore was blocked out in the mine to promise soon a steady new supply of lead concentrates to the Leadville smelter. In June, unwatering was begun at the Carbonate Hill and Graham Park mines at Leadville, which have been idle since 1918, though they contain ore bodies, and this work promises a large production of lead and zinc before the end of 1923. The lead-zinc ore bodies developed in the Dolly B mine, near the present terminus of the Yak tunnel, promise a large output of these ores, in addition to other ores from that property. The Down Town Mines Company at Leadville has continued to ship nearly all varieties of ore known at Leadville.

The Atlas and Mountain Top mines, near Ouray, which installed increased milling facilities in 1922, have been steadily yielding lead-silver concentrates. Clear Creek County has maintained a fairly regular output, and one new discovery at Silver Plume has already resulted in marketing some very excellent silver-lead ore. The East Butte concentration mill, at Silver Plume, has been operated at intervals during the spring, and it is now reported to be again in operation. The Wasatch-Colorado mill, which yields both lead-silver and zinc-silver concentrates, has been active at Silver Plume.

The Colorado miner has always adapted himself to the changing prices of lead, copper and zinc, as well as of silver, but he has mined gold with greater regularity. The gold dredges at Breckenridge have been steadily operated and the dredge installed in 1922 at Fairplay has been a regular shipper to the Denver Mint.

In the Cripple Creek gold district, sufficient ore has been produced from several well-developed mines in 1923 to maintain the steady operation, though not at full capacity, of the Golden Cycle roasting, amalgamation and cyaniding mill at Colorado Springs; and the opening of new ore bodies in several mines that have been steadily operated promises to yield ore for this mill for several years. In addition to the ore necessary to assure the steady operation of this mill at minimum capacity, still more ore is promised by the reopening of several mines that have long been idle. The Portland Independence nonroast concentration-cyanidation mill, at Victor, has again been placed in operation on low-grade ore, which otherwise would have been wasted material.

Gilpin County shows a modest revival of operations. The mines in San Miguel County, unhampered so far this year by fire and snow, which have impeded them for several years, have continued their production of gold-silver concentrates at an increased rate. The Yellow Pine mine, at Sugar Loaf, Boulder County, has been contributing its small but regular quota of smelting silver ores mined by lessees, as has the Caribou mine at Caribou. The installation of new milling machinery at the old Boulder County mill promises production from the milling ores that are planned to be blocked out at the group of consolidated properties at Caribou. Lesses at Silver Cliff have been making shipments of lead-silver-copper ores.

METAL MINING IN IDAHO IN 1923

THE output of the mines of Idaho has steadily increased during the first half of 1923, according to a statement issued by the Department of the Interior, based on statistics compiled by C. N. Gerry, of the Geological Survey. The value of the mine output in 1922 was $18,031,555, an increase from $15,776,819 in 1921. Though this value was far below normal, the activity at the large silver-lead mines suggests a marked increase in 1923. The mines of the Coeur d'Alene district are producing more silver-lead ore than they have for several years, and the Bunker Hill smelter and refinery, at Bradley, continues to operate two blast furnaces on custom ore and concentrate, largely from the Bunker Hill and Hecla mines. Lead material was also shipped to the lead smelter at East Helena, Mont., which is producing an unusually large quantity of lead bullion.

The gold produced in Idaho in 1922 was valued at $501,405, and most of it came from Quartzburg, in Boise County, from the dredges at Murray and Featherville, the Idaho Metals Company, at Machay, and the Talache mines in Bonner County. In 1923, the output of gold from the dredges may be greater, as well as that from the ore of the Talache mines. Gold ore of good grade is being developed in several properties in Idaho County, but operations are hampered by a lack of means of transportation.

The production of silver in Idaho in 1922 was 6,081,865 ounces, valued at $1 an ounce, a slight increase over the production in 1921. The prices of metal

and the conditions of labor decidedly favor an increased output in 1923. As all the large mines of the Coeur d'Alene district are active, a normal production of about 10,000,000 ounces should be reached. The Talache mines, in Bonner County, the fifth largest producer in 1922, was doubling its shipments of concentrate early in 1923. The Morning, Hercules, Callahan, Bunker Hill and Pittsburgh Idaho mines also showed marked increases. Though the value of the silver in Idaho forms a large part of the value of the mine output, no serious interruptions are anticipated as a result of the decrease in price from $1 to about 65 cents an ounce. Dividends will certainly be affected by a reduction in income that will amount to about $2,000,000 for seven months of the year, but the increase in the price of lead will probably offset this difference.

The output of copper in Idaho in 1922 was 3,282,842 pounds, valued at $443,184, an increase from 1,688,195 pounds in 1921. The Idaho Metals Company, at Machay, was shipping at the rate of about 1,200 tons a month early in 1923, a decrease from the rate in 1922. In Lemhi County, however, shipments from the Harmony and Pope Shenon mines were increased. Copper mines under development in Shoshone County made no shipments, but the two-mile tunnel opening the Montana-Idaho property at depth was completed early in the year.

In 1922, the mines of Idaho produced 195,834,205 pounds of lead, a slight decrease from 198,469,119 pounds in 1921. The average annual output of lead in the last ten years was about 290,000,000 pounds. With increased shipments from the regular producers, this output may be reached in 1923 if present conditions continue. Labor conditions have improved, and the price of lead has increased from 5.5 cents to more than 7 cents a pound. The largest productions and greatest increases are being made from the Bunker Hill, Morning, Hecla, Callahan, Hercules, Tamarack and Custer, Success and Pittsburg Idaho mines. In Blaine County, the faulted ore bodies in the Bullion and Mayflower property are being prospected by the Bunker Hill, Sullivan M. and C. Company, and the Minnie Moore mine has been sold to the Federal Mining and Smelting Company, which plans similar work.

The output of recoverable zinc in Idaho in 1922 was only 4,109,131 pounds, valued at $234,220, but the average of the last ten years was about 39,000,000 pounds a year. Since the price of zinc advanced to 7 cents a pound, the Morning and Callahan mines have been shipping zinc concentrate at the rate of about 2,200 tons a month. During the first quarter of 1923, the Callahan company shipped 5,745 tons of zinc concentrate, and before the end of the year other zinc producers will probably become shippers. The Success Mining Company has been storing zinc concentrate, while shipping lead products, and several mines in the Pine Creek region have zinc ore on hand. At Kellogg, an electrolytic zinc plant is under construction, in which it is planned to treat ore from the Star mine and possibly custom ore.

Dividends were paid in the early part of 1923 by the Bunker Hill, Federal, Tamarack and Custer, Hercules and Hecla companies.

METAL MINING IN UTAH IN 1923

The mines of Utah showed unusual activity during the first half of 1923, according to a statement issued by the Department of the Interior based upon statistics collected by V. C. Heikes, of the Geological Survey. The output of gold, silver, copper, lead and zinc in 1922 was valued at $40,424,199, and a substantial increase may be expected in 1923, especially in copper, lead and zinc. The production from the Park City, Tintic and Bingham districts has been especially large, owing to the effort of the companies to market silver at $1 an ounce.

Gold

Gold valued at $2,296,855 was produced in Utah in 1922, an increase from $1,769,905 in 1921. For ten years prior to 1922, the gold output has gradually decreased in Utah, but the output in 1923 will probably not be less if the present rate of ore production is maintained. The mines of Bingham produced gold valued at $1,187,355 in 1922, the Tintic mines $465,321 and Piute County $377,265. As the Utah Copper Company and Utah Consolidated Mining Company are returning to normal production in 1923, the gold from copper ore will probably show a decided increase. Shipments from the Deer Trail mines, in Piute County, have also been increased, and gold from the silver ores, especially from the Vipont, Park Utah, Chief Consolidated and Grand Central mines has made a remarkable record.

Silver

The output of silver in Utah in 1922 was 17,271,100 fine ounces, which was a high record for the State. Though this output was greater than that of any other State, the large producers are making decided gains in 1923. During the first five months of 1923, the Chief Consolidated, Tintic Standard, Park Utah, Silver King Consolidated, Judge, Vipont, Victoria and other mines were rushing shipments to the smelters at an abnormally large rate. The drop in the price of silver will certainly affect profits, but none of the large producers will cease to operate.

The operation of the Grand Central, Gemini and Eureka Hill mines by the Chief Consolidated Mining Company has made a marked improvement in the output of these mines. The most astonishing increase in silver production was made by the Park Utah Mining Company, which was shipping 7,000 to 8,000 tons of silver ore a month in 1923, more than double that shipped in 1922.

Copper

The production of copper in Utah in 1922 was 97,193,850 pounds, valued at $13,121,170, as compared with 30,891,403 pounds, valued at $3,984,991 in 1921. The Utah Copper Company, at Bingham, was producing at the rate of about 11,000,000 pounds a month early in 1923, and gradually increasing its output. Both the Arthur and Magna mills were active, and flotation equipment was being added to the several units of the Magna plant. The Utah Consolidated Mining Company, Ohio Copper Company and Montana Bingham Company were also producing much copper. Marked increases were made at the copper smelting plant at Garfield and International, Utah.

Lead

The output of lead in Utah increased from 89,187,269 pounds in 1921 to 135,332,144 pounds in 1922. As the three smelting plants and all the large lead-producing mines are running at their full capacity, a large increase in the lead output in 1923 seems certain. The United States Smelting, Refining and Mining Company, at Bingham, has increased its shipments of lead-zinc ore, and the Utah Apex is regaining its old place of prominence as a large lead producer. The Chief Consolidated mine, at Eureka, produced more than 7,000,000 pounds of lead in the first quarter of 1923. If the mine continues production at this rate, it may become the largest producer of lead in addition to being the largest producer of silver in the State.

Shipments of ore and concentrate from the Park City district have been more than doubled in the first half of 1923, and the Silver King Coalition, Daly West, Judge and Keystone mines have made unusual records. Shipments of ore from the Tintic district have increased about 20 per cent during the first six months of 1923, and increased shipments of lead ore were made by the Tintic Standard, Chief, Gemini and Vic-

toria mines. In 1922, the Tintic district produced 47,291,192 pounds of lead, the Bingham district 38,695,793 pounds and the Park City district 32,257,595 pounds.

Zinc

The considerable activity in marketing zinc concentrates early in 1923 indicates a decided increase over the output of zinc in 1922, which was 5,119,410 pounds. In 1916, the mines of Utah produced more than 29,000,000 pounds of recoverable zinc. Early in 1923, the Park City Mining and Smelting Company was increasing shipments of roasted zinc concentrate from the Judge ore. The electrolytic zinc plants at Park City were not operated. Zinc concentrate from Bingham ore milled at Midvale was being shipped to plant in Colorado and the East.

Dividends were paid in the first part of 1923 by the Utah Copper Company, Silver King Coalition, Chief Consolidated, Park City, Iron Blossom, Park Utah, Tintic Standard and United States Smelting, Refining and Mining Company.

METAL MINING IN MONTANA IN 1923

The mining industry of Montana showed a decided improvement the first six months of 1923, according to a statement issued by the Department of the Interior, based on statistics compiled by C. N. Gerry, of the Geological Survey. The electrolytic zinc plant near Great Falls was being operated at capacity, and the copper plant at Anaconda was treating ore and concentrate at a rate far in excess of that in 1922. The increase in the prices of copper, lead and zinc has stimulated mining at Butte and other districts of the State, and labor conditions are better than in recent years, though more men are needed at Butte.

Gold

Montana produced gold valued at $1,656,757 in 1922, an increase from $1,480,763 in 1921. In 1923, the output of gold is increasing from copper ore and silver ore, but gold from gold ore has decreased, especially in Lewis and Clark County, and gold from dredge operations in Madison County has ceased. The Barnes-King Development Company decided to abandon the Shannon mine, near Marysville, which has been a large producer of gold for several years. The activity at the Jardine mine, in Park County, the resumption of gold production in Phillips County, and additional shipment of gold-bearing iron ore from Deer Lodge County may offset decreases from other mines. Gold in Montana has decreased steadily since 1915, when the output was valued at more than $5,000,000.

Silver

The output of silver from Montana in 1922 was 12,468,151 ounces, valued at $1 an ounce, an increase from 6,558,713 ounces in 1921. In the early part of 1923, a substantial increase was shown in the production of both zinc ore and copper ore, which will doubtless have a beneficial effect on the production of silver. Operators at Butte, Philipsburg, Neihart and other camps were speeding up operations so as to market their ores before the termination of the Pittman act. The production of silver during the last half of the year may be somewhat curtailed, but the change in price will not prevent the operation of the large producers. In 1922, the value of the silver was more than 27 per cent of the total value of the mine output, but increases in the price and output of copper, lead and zinc in 1923 will be much greater than the decrease in the value of silver.

Copper

The output of copper in Montana in 1922 was 165,754,442 pounds, valued at $22,376,850, as compared with 48,098,730 pounds, valued at $6,204,736 in 1921. Since the copper producers of Butte resumed operations in 1922, the rate of production has been steadily increased. The Anaconda, East Butte, North Butte, Davis Daly and smaller properties were producing at the rate of about 19,000,000 pounds of copper a month early in 1923, as compared with an average of nearly 14,000,000 pounds in 1922. During the last ten years, on account of the greatly decreased production of the last four years, the average yearly production of copper in Montana was only about 230,000,000 pounds. The Butte and Superior mine is now shipping considerable copper ore to Anaconda, as well as maintaining a high rate of production of zinc.

Lead

Montana produced 29,767,479 pounds of lead in 1922, an increase from 20,336,917 pounds in 1921. As the production of zinc ore and lead-zinc ore has been decidedly increased, the output of lead will be correspondingly greater. Much of this class of ore is being mined from the Butte and Superior, Elm Orlu and Anaconda mines, and a large production of silver-lead ore is being produced from the Elm Orlu and other Clark properties. A large increase was noted in the shipments of bullion from the lead-smelting plant at East Helena, Mont., and several companies in Cascade and Judith Basin counties were shipping at a better rate.

Zinc

The output of recoverable zinc in Montana in 1922 was 119,069,818 pounds, an increase from 23,275,966 pounds in 1921. Late in 1922, the price of zinc increased to such an extent that the companies at Butte resumed operations. Early in 1923, the electrolytic zinc plant near Great Falls was operating at capacity, and the Butte and Superior, Elm Orlu, Anaconda, Emma, Hibernia and Moulton mines were actively supplying the plants at Anaconda and Great Falls with zinc ore and concentrate. The milling of zinc ore and lead-zinc ore is done largely at Anaconda, but some of the material is treated at the Timber Butte plant at Butte, which is used as a custom mill.

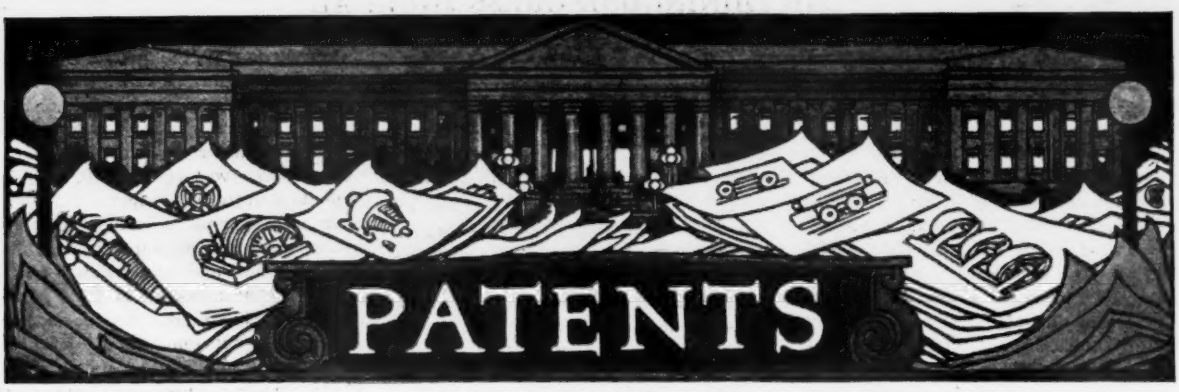
In April, the Anaconda Copper Mining Company paid a dividend of $2,250,000, and in March the Butte Copper and Zinc Company paid $300,000.

METAL MINING IN OREGON

A statement issued by the Department of the Interior, through the Geological Survey, reports that mining in Oregon during the first half of 1923 was fairly active, with development and prospecting in progress at a number of properties in both southwestern and eastern Oregon. With this development, the output from Oregon metal mines in 1923 may equal that in 1922, which was valued at about $829,800, of which gold amounted to $532,500, silver to $151,800, copper to $141,300 and lead to $4,200.

In eastern Oregon much work was done in expectation of the resumption of the Sumpter Valley smelter, which is scheduled to blow in during July or August. The mines in the Granite and Greenhorn districts have been particularly active in developing ore for shipment to the local smelter. The dredges on John Day and Powder rivers continued operations. The small boat on Burnt River was inactive, as a larger dredge is being installed. Hydraulic and sluice mining was approximating normal. The largest output in this region was made by the Iron Dyke, Bay Horse and Cornucopia mines, and the Buffalo-Monitor should make a good output from its new flotation mill.

In southwestern Oregon, there has been development at the Skyline, Sylvanite, Gold Ridge and Millionaire mines, and two mills are being constructed. The development is said to promise well, but, so far, there has been no additional production from quartz mines in this part of the State. The placer production of Jackson and Josephine counties will no doubt be comparable to that of 1922, though cold weather early in the season interfered to some extent with hydraulic work. It is understood that new equipment on the beaches might increase the output from Coos and Curry counties, but nothing definite has been heard recently of these activities.



CONDUCTED BY JOHN BOYLE, JR.

1,454,344—*R. H. Stewart*, Vancouver, British Columbia, May 8, 1923, assigned to Texas Gulf Sulphur Company.

PRODUCTION OF SULPHUR by underground fusion, with the discharge of molten sulphur at the surface of the ground, comprising continuously forming with sulphur while in a molten state into small thin cakes, moving the cakes in a substantially continuous manner from the point of their formation to a discharge point, and allowing the cakes to at least partially solidify during said movement so as to permit their continuous discharge in substantially solid form.

1,454,640—*F. W. Henrikson*, Mulberry, Kansas, May 8, 1923.

MINE CAR WHEEL comprising spaced spokes, each of said spokes having a locking slot therein and a hub cap having circumferentially-spaced lugs adapted to engage in said slots on angular movement of said cap on said lug.

1,454,656—*C. E. Rork and A. Sandberg*, Douglas, Ariz., May 8, 1923.

FLOTATION MACHINE comprising an agitating chamber, a rotable agitating device therein, a discharge passage way leading upwardly from the bottom of the chamber to an outlet opening adjacent the horizontal center of the agitating device, the discharge passageway and outlet opening being so disposed with relation to the agitating device that the liquid in said chamber will be lifted by the rapid rotation of said agitating device and discharged rapidly through said outlet opening in a direction opposite that of the rotation of said agitating device.

1,454,838—*W. O. Borcherdt*, Austinville, Va., May 8, 1923, assigned to New Jersey Zinc Company.

FLOTATION PROCESS for treating minerals associated in a mineral pulp with colloidal constituents, which comprises dispersing normally flocculated colloidal constituents in the mineral pulp, removing such constituents in a dispersed or deflocculated condition from the pulp to an extent sufficient to reduce the flotation inhibitory effects thereof.

1,454,904—*F. Pardee*, Hazleton Pa., May 15, 1923, assigned to Anthracite Separator Company.

SPIRAL SEPARATOR having a runway formed with a series of ridges adapted to exert an edge resistance on the material traveling thereon, said ridges being spaced so close together that the lumps in the material travel on the peaks of two or more adjacent ridges.

1,455,010—*J. C. Swan*, Marietta, Ohio, May 15, 1923.

METHOD OF DRILLING OIL WELLS which consists in carrying out the drilling operation with an anti-corrosive liquid more viscid than water. The preferred liquid used is coal tar. Other liquids may be used, such as wood tar, rosin dissolved in heavy tar oil or asphalt dissolved in benzoyl.

1,455,130—*W. W. Zickler*, Mullen, Idaho, May 15, 1923.

MINERS' LAMP.

1,455,284—*H. S. Davis*, Pittsburgh, Pa., May 15, 1923, assigned to Texas Gulf Sulphur Co.

PROCESS OF BURNING SULPHUR by associating with the sulphur a combustion accelerating material.

1,455,469—*W. D. Althouse*, Philadelphia, Pa., May 15, 1923.

SEPARATING COAL from impurities by the aid of a moving air current. The method consists in introducing mingled coal, slate and bone or bone coal, reduced to lump of about ⅛" or less in cross section into an ascending air column, of force sufficient to lift and carry with it all particles of lower specific gravity than that of slate, the slate falling out of the ascending column and being led away. The air current is sharply deflected and at the same time a regulated additional supply of air is admitted, whereby the volume of air is increased and the velocity is reduced, thus permitting the bone coal to fall from the air current to a second ascending air column, while the pure coal is carried onward to a pipe or separating chamber of larger diameter, and delivered into a third ascending air column, through which the pure coal is permitted to fall by reason of the reduced velocity of the current.

1,455,785—*G. C. Hackstaff*, Denver, Colorado, May 22, 1923.

SCREENING POWDERED ORE by means of a frame inclined about two inches in every twelve feet, a screen attached thereto comprising a plurality of sections of graduated mesh, a supporting member over each screen section, a magnet provided with a movable armature secured to said supporting member, means connecting said armature with the central portion of each screen section and means for periodically energizing said electro magnet whereby the latter vibrates the screen in a direction substantially perpendicular to the plane of the screen.

1,455,854—*E. T. Anderson* and *W. Morgan*, Scranton, Pa., May 22, 1923.

SKIMMING DEVICE FOR COAL JIGS for skimming the floating material from the top surface of the water in the jig tank, and for catching such lighter material as may be within the body of the water and above the top surface of the bed of coal in the jig, and means for discharging the said material from the said jig into the jig tank when the water is withdrawn from the latter, whereby the said material is withdrawn with the water from the said jig tank.

1,455,907—*A. C. Daman*, Denver, Colorado, May 22, 1923.

VIBRATING TROMMEL SCREEN in which the vibratory motion is obtained, without the use of eccentrics, cranks, connecting rods or other wearing parts. In operation the screen is slowly revolved by means of a pulley; at the same time an unbalanced pulley is revolved rapidly. A rapidly revolving weight causes the extremity of the shaft to gyrate rapidly, because of its flexible mounting in the box, and imparts a vibration to the screen in addition to the revolving motion imparted by the pulley.

1,455,925—*M. S. Moore*, London, England, May 22, 1923, assigned to Cowlishaw, Walker & Company, Ltd.

COAL CUTTING MACHINE in which the body is mounted upon supports capable of adjustment for the purpose of tilting the body of the machine to any desired degree laterally or longitudinally. Such machines have been proposed before in which the body of the machine is supported at the cutter end on two adjustable supports disposed laterally with reference to the longitudinal axis of the body of the machine, and at the haulage end by a single and centrally disposed support. The present invention has among its object to provide the supports so that their adjustment for tilting the body of the machine laterally or longitudinally may be effected at the haulage end of the machine.

1,456,054—*O. W. Crooks* and *E. H. Crooks*, Big Creek, Calif., May 22, 1923.

DUMPING MINE CAR.

1,456,165—*S. H. Whitney*, San Francisco, Calif., May 22, 1923.

ORE SEPARATOR, designed to separate platinum, osmiradium and gold from the silicate, quartz and magnetic and chrome sand with which the heavier metals are usually associated and comprising a pressure cylinder in which a regulated and predetermined quantity of water or air pressure may be maintained for acting on the lighter particles of ore which are deposited in the separator chamber and which forces the lighter particles to a point permitting the heavier particles to be deposited in a container positioned beneath the supporting frame.

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Roberts & Schaefer Co., McCormick Bldg., Chicago, Ill.

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Denver Rock Drill Mfg. Co., Denver, Colo.
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Lunkenheimer Co., Cincinnati, Ohio.

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Allis-Chalmers Mfg. Co., Milwaukee, Wis. (feed pump).

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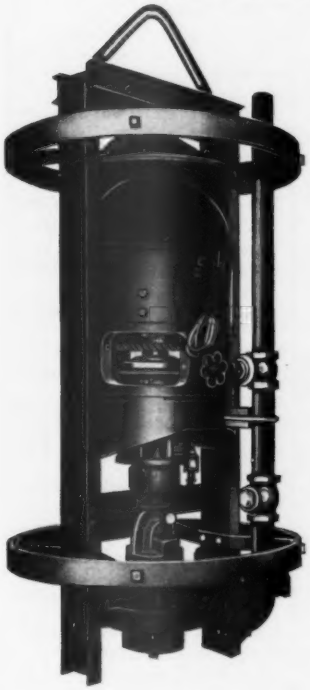

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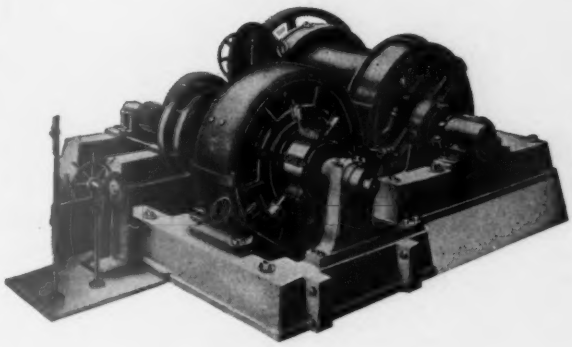

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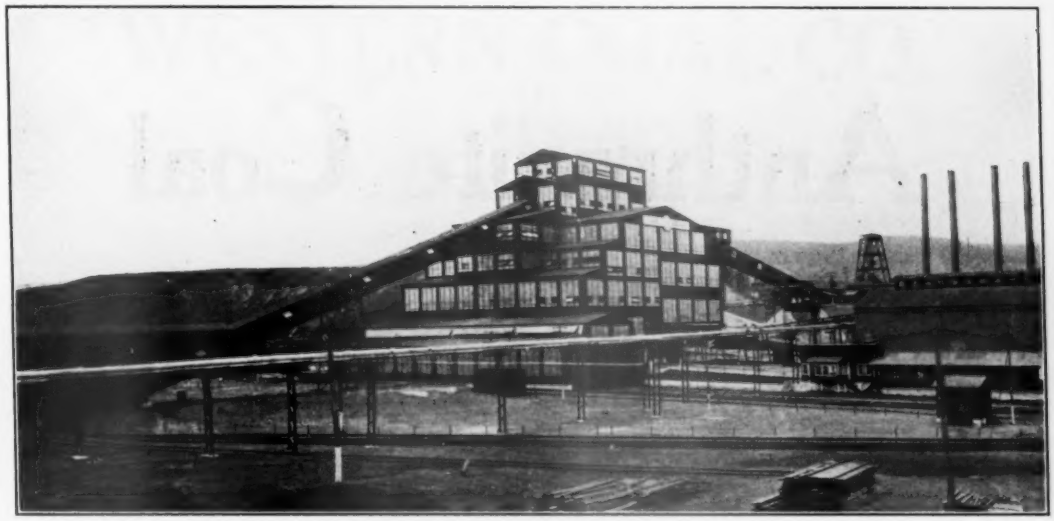

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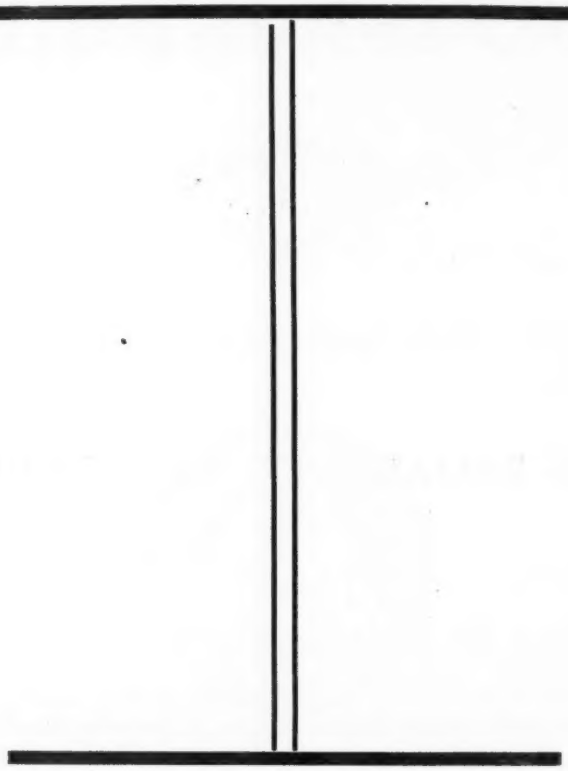

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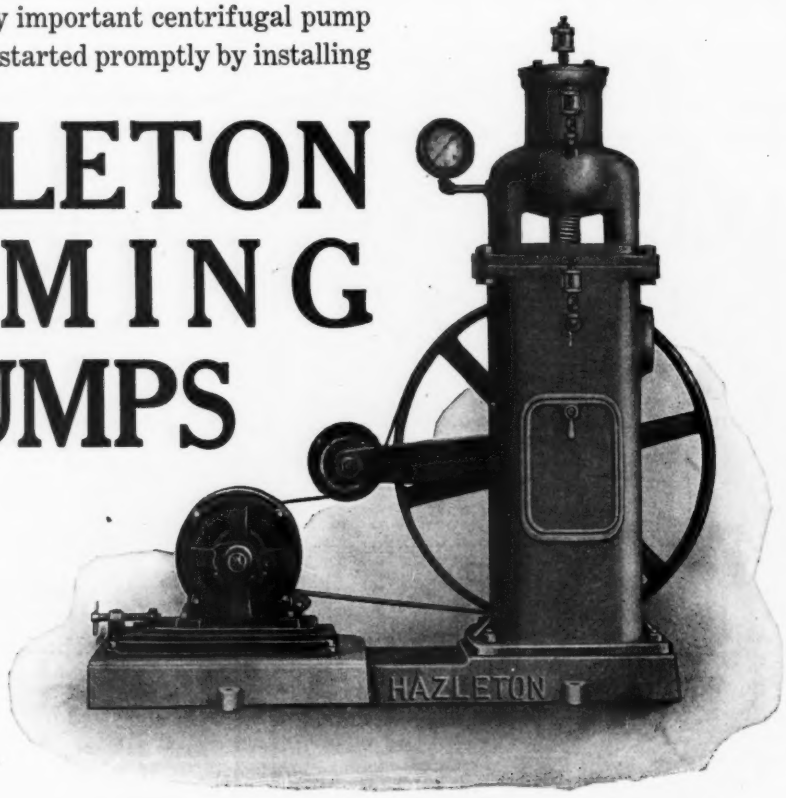

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